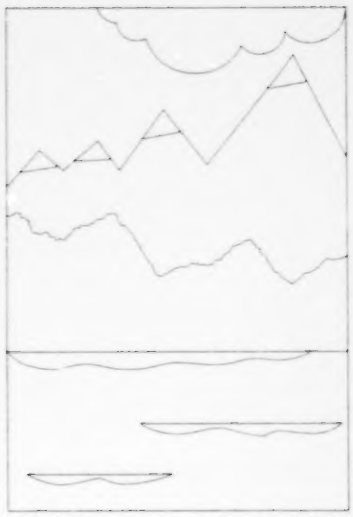


ANNUAL REPORT

1989
1990

Alberta
ENVIRONMENT

Alberta
ENVIRONMENT

Office of the Minister

130 Legislature Building, Edmonton, Alberta, Canada T5K 2B6 403/427-2391 Fax 403/422-6259

The Honourable David J. Carter
Office of the Speaker
Legislative Assembly of Alberta

Sir:

I have the honour to hereby transmit the Annual Report of the Department of the Environment for the year ended March 31, 1990.

Respectfully submitted,

RALPH P. KLEIN
Minister

Alberta
ENVIRONMENT

Office of the Deputy Minister

14th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6236

The Honourable Ralph P. Klein
Minister of Environment
130 Legislature Building
Edmonton, Alberta

Sir:

I have the honour to submit the twentieth Annual Report of Alberta Environment for the fiscal year ending March 31, 1990.

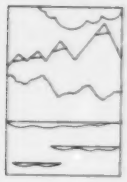
The department continues to carry out its diverse responsibilities successfully through the hard work and dedication of its staff.

Respectfully submitted,

Vance A. MacNichol, P.Eng.
Deputy Minister

92-04484/

TABLE OF CONTENTS



ORGANIZATIONAL CHART 2

EXECUTIVE SUMMARY 3

OFFICE OF THE DEPUTY MINISTER 5
Human Resources Management Division 6
Corporate and Strategic Management Division 8
Public Communications Division 8

ALBERTA ENVIRONMENTAL CENTRE 9
Analytical, Diagnostic, Extension and Technical Services 10
Pest Management Research and Development 10
Water/Wastewater Management Research and Development 11
Environmental Toxicology 11
Living Natural Resources 12
Waste Management Research and Development 12
Land Resources Management Research and Development 12
Technical Support 13
Administrative Support 13

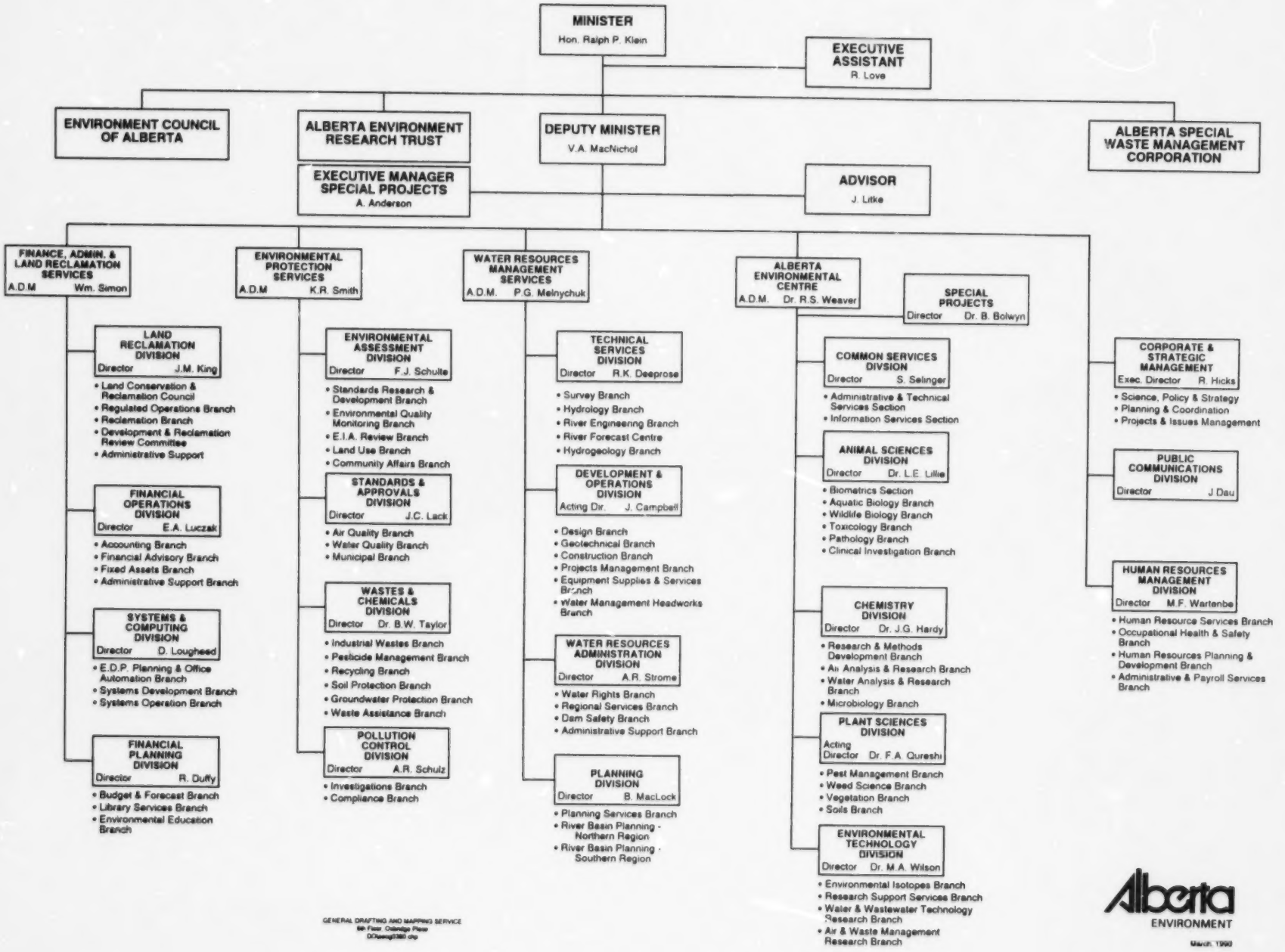
FINANCE, ADMINISTRATION, AND LAND RECLAMATION SERVICES 15
Land Reclamation Division 16
Financial Operations Division 18
Systems and Computing Division 19
Financial Planning Division 20

ENVIRONMENTAL PROTECTION SERVICES 23
Environmental Assessment Division 24
Standards and Approvals Division 27
Wastes and Chemicals Division 29
Pollution Control Division 34

WATER RESOURCES MANAGEMENT SERVICES 35
Technical Services Division 37
Development and Operations Division 40
Water Resources Administration Division 43
Planning Division 47

STATISTICAL TABLES 51

FINANCIAL STATEMENTS 59



GENERAL DRAFTING AND MAPPING SERVICE
8th Floor, Oxbridge Place
DOrg#3380.chp

Alberta
ENVIRONMENT
March, 1990

EXECUTIVE SUMMARY

During the fiscal year 1989-90, Alberta Environment instigated a number of initiatives to meet the challenges of its mission statement "to achieve the protection, improvement and wise use of Alberta's environment now and in the future."

In 1990 the Government of Alberta presented its environmental vision to the public in a document entitled, "Alberta's Environment Toward the 21st Century." The document explained the government's commitment to achieve the department's mandate through 10 environmental principles and 37 policy statements.

More than 25,000 vision documents were distributed throughout Alberta. Thousands of Albertans responded by letter to the Minister's invitation to "help shape our common future." Using this input, a first draft of the Alberta Environmental Protection and Enhancement Act will be developed. This act will be the overall legislation which will protect our environment and provide the framework for the development and enforcement of environmental regulations for Alberta.

Other initiatives in meeting the challenge of the department's mission included involvement with the Canadian Council of Ministers of the Environment and in playing a key role in initiating the Alberta Round Table on Environment and Economy.

The department continued to place a high priority on public communications and education through its considerable investment in public education.

Over the past year, four educational programs which explore environmental issues were developed. Also, the department introduced the Water Literacy Program that supports the science curriculum in Alberta schools. It was distributed at workshops to over 1,600 teachers across the province.

Several services actively provided information to client agencies and the public. The Alberta Environmental Centre published many studies that addressed environmental problems encountered by outside agencies. These studies were as diversified as using insects to control weeds, analysis of environmental pollutants and drinking water treatment and involved specialists from fields such as veterinary medicine, agrology, chemistry, microbiology, engineering and library science. Developing a true interdisciplinary approach to individual environmental problem-solving continues to be a priority of the centre.

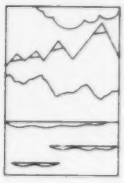
One of the major responsibilities during the year of the Municipal Branch in the Standards and Approvals Division was the administration and delivery of Certification and Training Programs for municipal water and wastewater operators in Alberta. The Certification Program is the first mandatory program of its type in Canada and was widely accepted by municipal employees who operate the water treatment, wastewater treatment, water distribution and wastewater collection facilities. During 1989-90, Alberta Environment remained committed to addressing water resources management concerns across the province.

The conservation and efficient use of existing water supplies was evident this year with the rehabilitation of the irrigation headworks and canal systems. In the area of flood protection, Alberta signed "An Agreement Respecting Flood Damage Reduction and Flood Risk Mapping" in April of 1989 with the Canadian Government. The objectives of the program are to identify and map flood risk areas in about 50 urban communities in Alberta and to regulate new development in these special areas.

The 1989-90 year saw the presentation of the third annual Alberta Environment Awards during Environment Week. The awards represent a commitment to environmental excellence in individual, volunteer, industry and education categories. Winners of the Alberta Environment Awards were: Mrs. Elizabeth Carol Hall (posthumously), individual; the Calgary Canoe Club, volunteer; Hewitt Oil Limited, industry; and the Hazchem Group, University of Alberta, education.

Alberta Environment, its management and employees throughout Alberta continue to be dedicated to the protection, improvement and wise use of the environment for present and future generations of Albertans.

OFFICE OF THE DEPUTY MINISTER

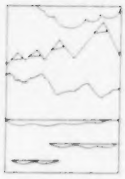


V.A. MacNichol
Deputy Minister

M.F. Wartenbe
Director
Human Resources Management
Division

R. Hicks
Executive Director
Corporate and Strategic Management

J. Dau
Director
Public Communications Division



HUMAN RESOURCES MANAGEMENT DIVISION

The Human Resources Management Division is directly responsible to the Deputy Minister for providing services to enable the department to effectively serve the public with a competent, safety-conscious work force.

The division consists of four branches which report to the director:

- Administrative and Payroll Services;
- Human Resources Services;
- Human Resources Planning & Development; and
- Occupational Health & Safety.

Administrative and Payroll Services Branch

This branch is responsible for the comprehensive payroll function in the department and administering benefits to employees.

It also provides a number of administrative services to the department including parking, commissioner for oaths and identification cards. As of March 31, 1990, the department had 1,140 positions (Table 1). These include 993 permanent and 147 project and super wage staff. Super wage is a new category effective May 1, 1989. More than half of the department's staff are located in Edmonton and the remainder are strategically placed to provide service throughout the province (Table 2). Distribution of employees within the department is reflected in Table 3.

During 1989-90, 73 salaried and 431 wage employees began work with the department, 66 salaried and 422 wage employees terminated their employment and 13 employees were transferred to other provincial government departments.

Human Resources Services Branch

This branch provides comprehensive human resources service through a staff of four consultants and the division director.

Organizational changes and regular updating of position descriptions resulted in the classification of 188 positions. The Administrative Support Series Review involved the classification of an additional 187 positions. The staff has delegated authority to make classification decisions on all positions except those in management. The branch conducted 119 recruitment transactions.

The staff of this branch assist employees and management with employee relations issues, career planning, organization development matters, grievances and complaint procedures. They also help administer the Long Term Disability Income program and with the design and delivery of in-house training.

Branch staff also participated in a number of special projects:

- Involvement in the collective bargaining process, and participation in divisional negotiations.
- Significant input into a proposed new Research Scientist classification series which is being designed to help attract and retain an increased number of world calibre scientists at the Alberta Environmental Centre in Vegreville.
- Continuation of a successful secondment program to train and develop new human resource professionals.

Human Resources Planning and Development Branch

Administration of the staff development and performance management programs required the most attention. The introduction of the Accelerated Management Training Program to the Women's Program was a welcome development and the department candidate has been progressing well.

Considerable time was spent with the Human Resources Planning Committee developing a plan for the department.

"Working Together As A Team" continues to be the most popular internal program. The Frontline Leadership program was offered in Edmonton and Vegreville. "Pension Information", "Career Planning", "Stress Management", "Telephone Courtesy" and "Learning over Lunch" sessions were offered as needed.

Staff participation in courses offered by P.A.O. and external suppliers increased again this year. Amendments to the Staff Training and Development Regulations resulted in some staff taking education leave.

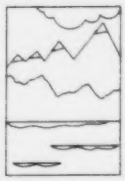
The Branch Head is the department nominee to the government's Human Rights Committee.

Occupational Health and Safety Branch

This branch co-ordinates the department's occupational health, safety and hygiene programs, provides a professional consultation service to staff and is the main contact with the Workers' Compensation Board, Alberta Occupational Health and Safety and the Occupational Health and Safety Branch of the Personnel Administration Office.

Emphasis remained on safety training and awareness programs, with special attention given to follow-up on last year's implementation of the Workplace Hazardous Materials Information System regulations (WHMIS). During the year, 42 in-house health and safety training programs were arranged involving more than 500 participants.

Work undertaken in the area of health and safety included work site visits, WHMIS inspections at 54 worksites, implementation of the Municipal Contractor Policy, development of a new back care education program and participation in a government-wide Back Care Committee established to develop a comprehensive program outline for use across government.



CORPORATE AND STRATEGIC MANAGEMENT DIVISION

The division was formed in 1988 to ensure effective corporate and strategic management of department activities.

Corporate and Strategic Management is headed by an Executive Director who reports directly to the Deputy Minister and is a member of Executive Committee.

The division's goal is to enable the department to better anticipate and respond to issues and requirements.

During 1989-90, Corporate and Strategic Management Division led a number of key department initiatives.

Division staff co-ordinated development of new environmental legislation which involved the following activities:

(a) assessing the state of existing legislation with its strengths and weaknesses.

(b) co-ordinating preparation and public distribution of a vision document which set out government environmental principles and policies.

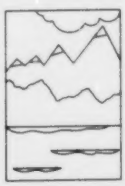
(c) obtaining and analyzing public response to the vision document.

(d) working within the department and with government committees to draft new legislation.

Division staff led or participated in federal/provincial and interdepartmental task forces set up to develop national and provincial strategies to deal with issues such as global warming, acid rain, ozone depletion, chlorofluorocarbons, and water quality protection.

Division staff also co-ordinated the department's activities with regard to the Canadian Council of Ministers of the Environment (CCME).

As well, the division played a key role in initiating the Alberta Round Table on Environment and Economy, now providing staff support to the Round Table Secretariat housed at the Environment Council of Alberta.



PUBLIC COMMUNICATIONS DIVISION

The division co-ordinates the communications needs of the department, including public and media relations, communications program planning, and the design, production and distribution of materials.

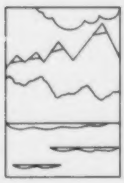
Because environmental issues again attracted a great deal of media attention, the division issued 213 news releases and responded to more than 3,000 media enquiries.

Four issues of the Environment Views magazine were published. Each issue dealt with a specific topic from various viewpoints with the aim of increasing awareness of environmental issues among Albertans. Featured topics included "What You Can Do"; "A Look At Alberta's Forests"; "Tomorrow's Environmentalists"; and "Air Quality Issues for the '90s". Total circulation of the free subscription magazine exceeded 15,000.

A number of activities were organized to mark the annual Environment Week celebration, including the Great Alberta Water Challenge, displays at shopping malls, media interviews and speaking engagements. A highlight of the week was the presentation of the third annual Alberta Environment Awards. Category winners of the 1989 Awards were Mrs. Elizabeth Carol Hall (posthumously), individual; Hewitt Oil Limited, industry; Hazchem Group, University of Alberta, education; and the Calgary Canoe Club, volunteer.

The communications director, two public affairs officers, two contracted consultants and a production co-ordinator in the Edmonton office handled 434 orders for print material, photography, advertising, displays, signage and audio-visual presentations.

ALBERTA ENVIRONMENTAL CENTRE



Dr. R.S. Weaver
Assistant Deputy Minister

Dr. B. Bolwyn
Director
Special Projects

S. Selinger
Director
Common Services Division

Dr. M.A. Wilson
Director
Environmental Technology Division

Dr. L.E. Lillie
Director
Animal Sciences Division

Dr. J. G. Hardy
Director
Chemistry Division

Dr. F.A. Qureshi
Acting Director
Plant Sciences Division

The Alberta Environmental Centre in Vegreville is the province's major facility for applied environmental research, technology development and related services. These activities were carried out at the request of provincial agencies and the public after review and approval by the Centre's Board of Directors and Technical Advisory Committee.

The Departments of Environment; Agriculture; Forestry, Lands and Wildlife; Health; Occupational Health and Safety; and the Alberta Research Council are the Centre's main clients. Alberta Technology, Research and Telecommunications continued efforts to find commercial applications for new technologies developed at the Centre. Inventions or processes which are potentially exploitable are being investigated.

While most of the research was conducted at the Centre's 19,000 square metre main laboratory building in Vegreville, staff also travelled throughout the province to pursue problems presented by client agencies. Studies were as diversified as using insects to control weeds, analysis of environmental pollutants, and drinking water treatment. They involved specialists from fields such as veterinary medicine, agrology, chemistry, microbiology, engineering and library science. Emphasis continued on attempts to develop a true interdisciplinary approach to individual environmental problems.

Demand for the analytical and diagnostic services available through the Centre again was heavy. More than 23,000 samples of water, air, soil and other materials were subjected to about 273,000 tests to support provincial programs in health, drinking water for human consumption, pollution abatement and control, and fish and wildlife management.

About 2,300 specimens of weeds, insects, plant diseases and chemically damaged plants were examined at the request of farmers, gardeners and agricultural personnel. The Centre also handled identification of some 200 non-medical bacteria using a unique, computer-assisted identification system and provided microbial toxicity testing services to clients requiring the evaluation of about 140 samples.

Providing information to client agencies and the public continued to be a significant part of the Centre's work. Staff responded to many inquiries for pest control and chemical damage information; they prepared and exhibited public displays; and they participated in numerous other activities including Environment Week in Vegreville.

The Centre carries out applied research in seven broad categories: analytical services; pest management; water/wastewater management; environmental toxicology; living natural resources; waste management; and land resources.

Analytical, Diagnostic, Extension and Technical Services

The Centre provides information on the quality of air and water, and on the results of studies on environmental pollutants, wastewater, weed science and crop protection, to the public and other government departments and agencies.

To ensure the accuracy of analyses performed at the Centre, quality assurance and quality control (QA/QC) are given high priority. For example, the Water Analysis Laboratory completes about 15,000 quality control tests per year, in addition to those requested by clients, to assure the quality of data produced in that laboratory. The Research and Methods Development Branch tested for 8,210 parameters to ensure the quality of trace organic analysis results.

The Centre is the main chemical analysis laboratory providing support to Alberta Environment's licensing, investigation, monitoring and enforcement programs. As part of a major air analysis services program, approximately 6,600 air samples were run through more than 17,000 tests. Centre staff also worked to develop new and more effective tests for atmospheric pollutants, such as SO2 (sulphur dioxide). A project has been established to study the background levels of greenhouse gases in Alberta. Two hundred precipitation samples were analysed for 2,000 parameters under the Precipitation Studies program. Under the federal government program on Long Range Transport of Air Pollutants (LRTAP), 30 precipitation quality control check samples were analyzed.

The Water Analysis Laboratory was provided with 6,020 drinking water samples from private wells by Alberta Public Health Units for chemical evaluation of domestic drinking water quality. Also, Alberta Environment submitted 5,449 samples for chemical testing, primarily for Environmental Protection Services programs. In total, 12,094 samples were analyzed for almost 175,500 chemical parameters. A total of 1,588 samples of PCBs (polychlorinated biphenyls), hydrocarbons and other significant pollutants, were subjected to 52,663 tests.

A method for the determination of Adsorbable Organic Halides (AOX) in pulp mill effluents was developed and the methodology has also been used to measure AOX in receiving waters.

The Water Analysis Laboratory continued investigations into improved sulphide analytical methods for environmental and toxicological samples. A new procedure for preservation and analysis of sulphide in blood was presented at a conference in Alberta.

The Water Analysis Laboratory implemented new method development applications for the analysis of heavy metals in biological samples, and evaluated the performance of the methods using natural samples from the Battle River Multimedia Pilot Project.

Pest Management specialists provided diagnostic services to farmers on problems of insects, plant diseases and weeds, and suspected chemical damage to plants. In 1989-90, 377 insect, 611 plant disease and 290 weed specimens were diagnosed. Another 876 plant, soil and water samples were processed for diagnosis of chemical damage to vegetation. An extension publication, 'Insect Pests of the Prairies', was published in co-operation with Alberta Agriculture.

The Environmental Isotopes Program continues to provide tritium, radiocarbon and Del-C13 analyses to several Alberta Government agencies. This expertise is now also provided world-wide on a contract basis. These isotopic applications have focused on areas such as soil salinity, groundwater movement, surface erosion, waste repository characterization, paleoenvironmental and archaeological studies required by law before archaeologists can proceed with exploratory digging at historic sites.

Electron microscope studies supported research into inhalation toxicology, plant diseases, waste management and many other fields. A total of 900 electron microscopy investigations were conducted.

Other services provided by the Centre included assistance in the investigation of chemical spill accidents, assistance in the capture of big game animals, and developing methods for the detection and analysis of a variety of environmentally significant chemicals.

Pest Management Research and Development

This program emphasizes the development of pest management methods which are environmentally safe and economical. Chemical, cultural and biological control methods were devised and chemical pesticide residues were detected and analyzed in environmental samples. During the year, 10 scientific papers and reports were published.

Insect pest management studies to develop integrated control strategies for greenhouse and field crop insect pests were conducted with emphasis on the implementation of biological and cultural control measures as alternatives to chemical insecticides. For example, the effectiveness of using a parasitic wasp to keep sweet potato whitefly populations on greenhouse crops in check was researched. A Farming for the Future grant allowed the investigation of the potential of using pirate bugs and predatory mites against greenhouse

thrips. Research on alternative methods of control of field crop insect pests included evaluation of tillage regimes to reduce root maggot populations in canola, and evaluation of biological control agents against bertha armyworm larvae. Staff participated in a regional crops variety trial conducted at four sites in northeastern Alberta to evaluate tolerance to disease and insect pests in new varieties of grains and canola.

The main goal of the plant disease research program is to maintain disease levels below the economic threshold. Field surveys were conducted to detect newly introduced diseases and to monitor the spread of established diseases. Research efforts were directed towards employing cultural, chemical and biological control measures in disease management. Research continued on performance evaluation of new and registered fungicides.

Weed scientists conducted field and controlled environment experiments and surveys to determine the magnitude of weed problems and economic losses. A weed survey of agricultural land of Alberta was completed. Research on weed control strategies to avoid herbicide carry-over in soil included field studies on Treflan®, Edge® and Sencor®. This research is essential to help farmers avoid damaging their crops with herbicides.

The Centre also carried out studies on biological control of weeds as alternatives to chemical control. In co-operation with the International Institute of Biological Control in Switzerland, the Agriculture Canada Research Station in Regina, and Alberta Agriculture, research was directed at screening and field testing beneficial insects on several problem weeds. The root-feeding fleabeetle was successfully established on leafy spurge in Southern Alberta and was redistributed from there to numerous sites throughout the province. A survey of weed diseases in Alberta, funded by Farming for the Future, was completed. In another biocontrol program, several indigenous plant pathogens were isolated from diseased weeds and tested for weed control. If naturally occurring fungi and bacteria can be sprayed in high concentrations on weeds, that too will reduce the use of chemical herbicides.

Staff also analysed pesticide residues in water, soil, vegetation and sediments. A total of 650 samples were tested for pesticides, which constituted some 26,814 tests.

Water/Wastewater Management Research and Development

Research continued on the acute and chronic toxicity to fish and crustaceans of municipal untreated and treated sewage. The study aims to determine the reduction in the toxicity of wastewater as it passes through a treatment facility. The information gained helps to identify the safest means of treating municipal wastewater in Alberta.

Invertebrate assay systems, among the most comprehensive in North America, were developed to determine the effects of toxic agents on two crustacean species, two mollusc species, and two fish species.

The Centre's water treatment research pilot plants were used to evaluate drinking water treatment technology, particularly on ways to render harmless or remove the organism which causes giardiasis ("beaver fever"), a project carried out in co-operation with the University of Calgary. A project on improving the water treatment facilities in Elk Island National Park was undertaken. Studies were begun on the effect of pulp plant effluents on drinking water treatment processes.

Determining the effects of wastewaters on natural water systems and the life they support was the object of a number of aquatic toxicology studies. New laboratory techniques continue to be used to study changes in fish exposed to industrial, agricultural and municipal effluents.

As part of the department's evaluation of the effects of pulp mill effluents in northern rivers, a major laboratory study of the Ultimate Biochemical Oxygen Demand of effluents was undertaken. The Centre's water treatment research pilot plant was used on-site at the E.L. Smith Water Treatment Plant in Edmonton to evaluate powdered activated carbon as a treatment technology for the annual spring runoff odour problem.

Environmental Toxicology

Inhalation Toxicology is the study of the effects of inhaled gases, vapours, particulates and aerosols in animals and, by extrapolation, humans. This long-term research program was developed in response to wide-spread concern about the possible health effects of sour natural gas. Hydrogen sulphide H_2S, the major contaminant of sour gas, has been the focus of a series of 22 studies to date in the 360m^2 inhalation toxicology containment facility. Reports of completed work were published in scientific journals and at scientific meetings.

At the request of Alberta Agriculture, a major research program continues on the effects of crude oil and drilling materials on livestock. During last year, three studies were conducted on the effects of exposure of beef cattle to a typical, light, sweet, Alberta crude oil. The laboratory and data analysis phases of this work are continuing.

At the request of the Irrigation Secretariat of Alberta Agriculture, 3,000 grass carp, a grazing fish, were again raised under quarantine for one year. The Centre's staff

check for sterility and ensure that only disease-free fish are handed over to Alberta Agriculture for release in irrigation canals. This project, now in its second year, is a first in Canada to use grass carp as a biological control agent for aquatic weeds.

At the request of Alberta Technology, Research and Telecommunications, safety assessment studies were completed on a candidate biological herbicide being developed as an alternative to chemical herbicides against selected weeds in western Canada. Safety assessment studies were provided to assist small western Canadian companies attempting to develop biological products of potential commercial importance.

Living Natural Resources

Work continued on methods for controlling pocket gophers in forage crops. Three formulations of toxicants placed in pocket gopher burrows were evaluated for their efficacy in controlling the rodents. Research was completed on the evaluation of barriers to prevent pocket gophers from recolonizing fields of newly established forage crops.

At the request of Alberta Forestry, Lands and Wildlife, Centre staff continued a research program to evaluate the efficacy of Ropel® and Thiram in reducing damage to spruce seedlings by hares. Initial data showed the chemicals to be essentially ineffective in reducing hare damage under the research conditions. Work is continuing on this program with emphasis on an alternative approach.

The field investigation phase of a fish population study on a major water control project (the Dickson Dam) and reservoir (Gleniffer Lake) was completed. The study showed that Gleniffer Lake cannot support an appreciable sport or commercial fishery.

Waste Management Research and Development

The Centre continues to be involved in co-operative efforts with other organizations. At the "International Workshop on Environmental Pollution", held in Beijing, China, Dr. Malcolm Wilson, Director of Environmental Technology Division, presented a paper and served as session chairman on the topic of hazardous waste management. Along with the Canadian Council of Ministers of the Environment, the Centre undertook a project to evaluate regulatory test methods for measuring contaminant leaching.

The quality assurance support given to the Alberta Special Waste Treatment Centre in Swan Hills has been further developed into a tool for quantitatively assessing whether compliance is met.

With the New Jersey Institute of Technology, the application of solidification as a containment of organic contaminants has been investigated and shown to be promising. A project on permeability has also been undertaken in co-operation with the US Environmental Protection Agency.

Decolourization of kraft mill effluent by white-rot fungi has been demonstrated. The capability of white-rot fungi to degrade PCBs and other contaminants is also being evaluated.

Research and developmental work continued on the use of microbiological processes and systems in waste management. Emphasis was placed on the detection and quantitation of odour-causing compounds associated with pig waste handling, as well as toxicity assessment of solid samples using short-term microbial tests.

Land Resources Management Research and Development

Land resource management programs at the Alberta Environmental Centre offer research, analytical and advisory services to all government departments in land reclamation and conservation.

Research in soil science has focused on finding ways to overcome the physical impediments to reclaiming land.

Staff are working on correcting problems such as soil compacting on heavy equipment and soil damage from frequent oil spills.

Research in the Vegetation Branch is directed to developing native plant varieties suitable for reclaiming disturbed lands in high stress or sensitive environments where agronomic species are not suitable. The goal of this program is to select, test, register and make available native plant material for use in reclamation, erosion control and range improvement.

Five native grass species with potential for use in reclamation of disturbed sites in alpine areas were chosen for in-depth study. Plants of each species were collected from 330 sites and the collected specimens were transplanted to field nurseries at the Centre in Vegreville. These long-term studies are expected to result in one or more lines of wheatgrass and/or alpine bluegrass being registered and commercially available in the near future.

This year another project was initiated to test, select and develop native legume species suitable for use in reclamation.

Technical Support

A total of 31 regulatory and supporting quality assurance bioassays of industrial wastewater were conducted in support of the Alberta Clean Water Act.

Technical and administrative support essential for the operation of diverse applied animal-based research programs continued to be provided. The Animal Resources Program and the operation of the Centre's Animal Care and Use Committee ensured that all work complied with the guidelines of the Canadian Council on Animal Care.

Essential services in clinical, anatomical and ultrastructural pathology, biochemistry and analytical toxicology were provided by the Pathology and Clinical Investigation Branches. Professional statistical and administrative support services were provided to all programs.

The site support program includes the management and development of the Centre's 300-hectare Vegreville site. Crop research plots were developed and maintained, plot equipment was designed and maintained, and the site was upgraded. A large fleet of equipment and vehicles was maintained, including specialized experimental plot machinery.

The Centre's waste management program continued with the operation of an interim wastewater treatment plant and systems for managing pesticides and concentrated laboratory wastes. As well, three specialized water treatment systems were operated without interruption. The Centre completed a long-term strategy plan for Centre-wide computing activities.

The Instrumentation and Controls program continued repair/maintenance of analytical instruments as well as design and development of equipment and systems for monitoring and data collection purposes.

The auto-dial, voice activated monitoring system, which permits the unmanned, continuous operation of the Recycle Water Treatment Plant, operated successfully.

Administrative Support

Administrative support was co-ordinated to Centre programs through the Common Services Division and implemented by the administration units of the four other divisions.

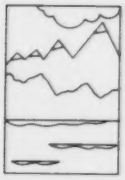
Library, financial, communications, human resources and related functions were performed by the Common Services Division. The library provided information to staff through reference searches, collection development, inter-library loans and similar services. A plan is being prepared to centralize all library materials in a proposed Annex.

Externally funded research programs, totalling $232,290, were administered. Administration and control of the Centre's $11.1 million budget resulted in only 0.14% of the budget left unexpended.

Staff from the Centre organized a local co-ordinating committee which organized the first Toxic Round-Up in the Town of Vegreville in 1989. Centre staff also participated in other Environment Week activities, such as Adopt-a-Classroom and tours. One staff member was trained in public speaking so the Centre could participate in the Department of Environment's Speakers' Bureau. One presentation was made on "Personal Action" to a group in north eastern Alberta.

The Common Services Division continued to provide the majority of other administrative and technical services such as purchasing, warehousing, accounting, records management, courier, chemical waste disposal, etc. Public tours of the Centre were conducted.

FINANCE, ADMINISTRATION, AND LAND RECLAMATION SERVICES



Wm. Simon, CMA
Assistant Deputy Minister

J.M. King
Director
Land Reclamation Division

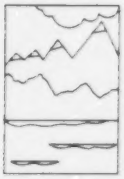
E.A.Luczak
Director
Financial Operations Division

D. Lougheed
Director
Systems and Computing Division

R. Duffy
Director
Financial Planning Division

Finance, Administration, and Land Reclamation Services provides administrative and support services to the department in the areas of financial planning, financial operations and systems and computing. As well, the Assistant Deputy Minister is responsible for the Land Reclamation Division and its related interdepartmental functions.

He is a member of the department's executive committee and is the senior financial officer of the department charged with the responsibility of administering the Financial Administration Act. This work establishes a system of internal controls, develops a code of accounts to satisfy both central agency and departmental requirements, satisfies financial reporting needs of department personnel and advises expenditure officers on expenditure monitoring and control.



LAND RECLAMATION DIVISION

The division administers The Land Surface Conservation and Reclamation Act and regulations.

Applications and impact assessments of proposed developments which disturb land are reviewed by the division and conditional approvals which set land reclamation standards are granted. Staff also carry out inspections, reclamation projects and special studies to enforce and improve reclamation and environmental planning.

The division administers the Surface Reclamation fund which comprises security deposits paid by developers to support satisfactory reclamation of disturbed land.

Land Conservation and Reclamation Council

The Council is responsible for ensuring that the construction, operation and abandonment of well sites, access roads, pipelines, transmission lines, sand and gravel, coal and oil sands operations are done so that the land may be returned to the same productive capability it possessed prior to the disturbance.

During 1989-90, the 21 provincial and 163 municipal government reclamation officers within the Council monitored the operation of 878 development and reclamation approvals and 33 exploration approvals, and issued 152 reclamation orders and 1,242 reclamation certificates on abandoned surface disturbances.

Development and Reclamation Review Branch

The branch administers and chairs three inter-departmental committees: the Development and Reclamation Review Committee, the Crown Mineral Disposition Review Committee, and the Exploration Review Committee.

Development and Reclamation Review Committee

The Development and Reclamation Review Committee is an inter-departmental committee which carries out detailed technical reviews of major coal and oil sands development applications. The committee recommends operational terms and conditions for development and reclamation approvals issued by the Minister.

During 1989-90, two new development and reclamation approvals were issued. The bulk of the committee's work involved reviewing applications for amendments to existing development and reclamation approvals. Some 32 amendments were issued during 1989-90, two to oil sands mining operations, 18 to coal mines, and 12 to oil sands in situ developments.

Crown Mineral Disposition Review Committee

This committee reviews requests for sales of Crown mineral rights to ensure that serious environmental effects will be avoided in future. In certain cases, it requests lands withdrawn from sales.

In 1989-90, the committee reviewed 50 schedules relating to coal (3), quarriable minerals (7), metallic minerals (10), placer minerals (2), salt leases (8), and ammonite shell leases (20). Biweekly oil and gas schedules (26) constituted most of the work load over the year.

Exploration Review Committee

The Exploration Review Committee carries out detailed technical reviews of coal exploration applications and recommends operational terms and conditions for exploration approvals issued by the Minister.

During 1989-90, the committee reviewed and recommended approval for 12 coal exploration programs, as well as three amendments to existing programs.

Regulated Operations Branch

The branch reviews pipelines, electric transmission lines, industrial environmental impact assessments (EIA) and gravel operations applications. An inter-departmental review of regulated pipeline and gravel operation applications and high voltage electric transmission line projects is also co-ordinated here. After the review, approval conditions are recommended to the chair of the Land Conservation and Reclamation Council.

Linear Projects Section: This section is responsible for the inter-departmental co-ordination of the review of major electric transmission lines and oil and gas pipelines referred by the Energy Resources Conservation Board (ERCB). The section also makes recommendations to the chair of the Land Conservation and Reclamation Council for development and reclamation and ministerial approvals. As well, it reviews water and sewer pipeline projects and environmental impact assessment reports for major industrial developments. Section staff represent the Crown at ERCB hearings on pipeline and transmission line projects (Table 4).

Sand and Gravel Section: Under the Sand, Gravel, Clay and Marl Surface Operations Regulation, all large sand, gravel and clay operations on patented land in the province require a development and reclamation approval.

The program to notify the landowners of a gravel operation and to advise those holding a gravel lease of the regulation requirements continued during the year.

In 1989-90, the program focussed on eight municipalities which contained 255 gravel operations, of which 88 required development and reclamation approval. To April 1, 1990, 2,744 pit operations have been recorded in 52 municipalities with 904 requiring approval. The remaining operations were either minor or inactive and did not require approval.

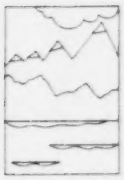
During the reporting period, 142 applications for development and reclamation approval were reviewed. One hundred seven new and 51 renewal approvals were issued to developers including counties, Alberta Transportation and Alberta Environment.

Reclamation Branch

The Reclamation Branch is comprised of the research and operational components of the Alberta Heritage Savings Trust Fund Land Reclamation Program. The operational reclamation section of the branch reclaims the land at derelict sites to productive use. Of the 68 sites reclaimed, 57 were located on municipal and 11 on Crown land (Table 5). The majority of the operational projects undertaken are abandoned garbage dumps, landfills, sewage lagoons, and gravel/sand pits, located on municipal land.

The reclamation research program identifies better methods of reclaiming disturbances created by activities such as mining, drilling and pipeline construction. The inter-departmental Reclamation Research Technical Advisory Committee (RRTAC) sets research priorities that are reviewed each year.

In 1989-90, RRTAC committed $480,162 from the Heritage Savings Trust Fund to reclamation research. Government and industry committees co-ordinate research in four program areas: plains coal, mountains foothills, oil sands, and oil and gas. Twelve final reports were published and are available from the Queen's Printer.



FINANCIAL OPERATIONS DIVISION

This division provides centralized financial and administrative support services to the department, including the development and implementation of policies, procedures and systems to ensure compliance with the Financial Administration Act and other related central agency requirements.

Division staff provide consultation and guidance in expenditure and revenue accounting, financial systems development, fixed asset management, internal system reviews and administrative support services.

In May 1989, the Administrative Support Division was incorporated into the Financial Operations Division.

Accounting Branch

The branch develops, implements and maintains departmental accounting and financial reporting systems. Responsibilities include payment of all vendor accounts, control and reporting of assets and liabilities, collection of accounts receivable, and review and approval of all departmental contracts, grants and agreements.

Fixed Assets Branch

The branch is responsible for the development and implementation of policies, procedures and systems to ensure adequate control and efficient management of departmental fixed assets. It provides departmental management with consultation services relating to financial securities, maintains Surface Reclamation Trust Fund financial records and prepares the annual financial statement for the Land Conservation and Reclamation Council.

As well, it develops and distributes departmental administrative polices and documents procedures to assist staff in operational activities.

Financial Advisory Branch

The branch provides advisory services to divisions on accounting, financial and administrative polices and procedures, enabling management to make appropriate and timely decisions when responding to extraordinary issues or concerns and ensuring their goals and objectives are met.

The branch applies the concept of operational auditing with a management perspective when conducting internal reviews of departmental systems. This concept involves the systematic appraisal of unit or function effectiveness, to assure management its aims are being carried out or to identify conditions to be improved. This approach results in increased efficiency, economy and effectiveness of operations and operating procedures, improved program delivery, optimum use of resources and better management information.

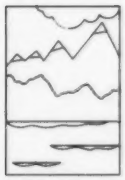
Responsibilities of the branch also include liaison with the Office of the Auditor General and Alberta Treasury to ensure compliance with government guidelines, directives and legislation.

Administrative Support Branch

Office Support Services and Records Management Sections make up this branch.

The Office Support Services Section provides central duplicating, courier and mail services, building maintenance, security and other support services in Edmonton central office. Telecommunications, furniture, photocopying, facsimile and diazo equipment services are also provided in both Edmonton and regional offices.

The Records Management Section co-ordinates and develops the records management program in accordance with the Public Works, Supply and Services Act. An operational records system for the Environment Protection Services was developed, starting with initial projects in Waste and Chemicals and Pollution Control Divisions. A Records Management User Guide was developed for administrative staff in the department.



SYSTEMS AND COMPUTING DIVISION

The Systems and Computing Division supports all departmental programs in planning, development, operation, and maintenance of computer programs and systems. The division also provides computing training and facilities to staff.

EDP Planning and Office Automation Branch

The branch develops computer systems and departmental electronic data processing plans. It also conducts feasibility studies concerning computer systems and develops and implements word processing, electronic mail and electronic filing systems.

Systems Development Branch

The branch is responsible for managing projects involving the development and enhancement of large and medium scale computer systems. The branch develops detailed system requirements, designs the system, and handles programming and implementation. The branch provides technical support and advice on telecommunications, data base and electronics.

Systems Operations Branch

The branch keeps operational systems current and operating reliably and efficiently. It also develops smaller systems, enhances and maintains all general-use equipment. It provides a consulting service to staff on operational problems.

Current Systems

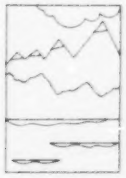
Over 100 data and scientific computer programs are used in the department. The systems contain air quality, water quality, hydrometric, climatological and groundwater data needed in the department's monitoring, assessment and regulatory activities. Administrative systems, such as a contract registry, groundwater well and water resource administration systems are also operated by the department.

Projects Completed

Improvements were made in the office automation area and technical data analysis areas. Assistance was provided to the department in delivering the Management of Underground Storage Tanks (MUST) program. Workstations were also installed to improve word processing capabilities and to assist in report, document and licence preparation and administrative tasks.

Co-ordination and Planning

The department and Environment Canada continued exchanging data and systems technology. These exchanges involved water quality, air-monitoring and hydrometric data. The department has access to Canada Land Inventory data, indexes of available satellite and air photo imagery, data about municipal water and wastewater treatment facilities and to information about special wastes and pesticides.



FINANCIAL PLANNING DIVISION

The Financial Planning Division provides a diverse number of services both to the department and to the public through three branches: Budget and Forecast, Education, and Library Services.

The Budget and Forecast Branch is the departmental focal point in providing financial planning, which includes budgets, forecasts and accommodation planning.

The Education Branch supplies all departmental education programs, materials and services. These programs and services are delivered to formal and community educators and members of the general public.

The Library Services Branch offers information services to department staff and external users.

Budget and Forecast Branch

The branch compiled the 1990/91 Alberta Heritage Savings and Trust Fund departmental budget of $42,900,000 and the 1990/91 General Revenue budget of $93,107,000. The branch also co-ordinates the Public Works, Supply and Services budget submission for capital construction and accommodation.

The branch monitored the 1989/90 departmental general revenue and Alberta Heritage Savings and Trust Fund expenditures as well as provided management of departmental space needs and insurance matters.

Environmental Education Branch

The branch continued to develop educational materials and deliver educational services to the public through schools, post-secondary educational institutions, youth groups and community organizations. As well, the branch develops and co-ordinates the department's Environment Week program. In addition, the branch worked closely with several other organizations including the Friends of Environmental Education Society of Alberta, the Environment Week Association of Alberta, and several specialist councils of the Alberta Teachers' Association.

Programs in development or implemented in 1989/90 include the following:

The Water Literacy Program: Units for elementary grades 4-6 dealing with issues such as water sources, uses, management, supply and quality were distributed through workshops to more than 1,600 teachers across the province. These units support the science curriculum in Alberta schools. Production work for the junior high school units (grades 7-9) was also started. The grades 8 and 9 units were introduced to science teachers towards the end of the fiscal year.

The Home We Share: This poster and teacher activity package continued to be a very popular product for 1989/90. An additional 20,000 copies were printed and distributed along with more than 2,000 sets of the teaching package.

Let's Recycle: Some 20,000 additional copies of this poster (40,000 in 1988/89) were printed and distributed along with 2,000 sets of the teaching package.

Caring for the Land: A third poster on land use and land reclamation and a teaching activity package was developed. A print of 20,000 copies and 2,000 activity packages were collated to prepare for distribution in the 1990/91 year.

A Traveller's Guide to Spaceship Earth: A fourth poster on the theme of atmospheric change and personal action, was developed. Production of the poster, as well as development and production of the teaching activity package, will occur in 1990/91.

Environment Week Program: The department's Environment Week Program helped more than 1,000,000 Albertans become more aware of the environment. The branch was responsible for co-ordinating a program that included the following elements:

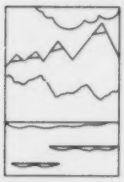
- more than 500 staff participating across Alberta
- more than 700 classrooms being "adopted" by Alberta Environment employees who presented to more than 12,000 children of all grades
- tours of environmental displays, talks, and demonstrations by more than 20 staff to nine communities in northeastern Alberta
- the delivery of more than 500,000 pieces of information and education material to Albertans
- more than 75 displays and demonstrations in some 50 communities across the province
- the Great Alberta Drinking Water Challenge, in which communities competed for the title of Best-Tasting Water in Alberta.

Library Services Branch

The branch provides information services in support of departmental research, program and policy-making needs. Private industry, other government agencies, environmental interest groups, members of the public and students of educational institutions also make use of its resources. Services provided include the following: departmental publications distribution, purchase of all books, documents and periodicals for the department, organization of these materials for accessibility; and dissemination of these information resources through current awareness, reference, computerized information retrieval and interlibrary loan activities.

Staff of the Library Services Branch responded to more than 28,000 requests for information on environmental topics. As in previous years, non-departmental users continued to make significant use of the library and account for more than half of all reference requests.

ENVIRONMENTAL PROTECTION SERVICES



K.R. Smith
Assistant Deputy Minister

F.J. Schulte
Director
Environmental Assessment Division

J.C. Lack
Director
Standards and Approvals Division

Dr. B.W. Taylor
Director
Wastes and Chemicals Division

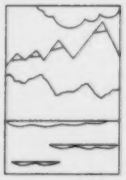
A.R. Schulz
Director
Pollution Control Division

Environmental Protection Services works to ensure that Alberta Environment's mandate for the protection, improvement and wise use of our environment now and in the future is accomplished.

The service ensures that thorough environmental evaluations are carried out prior to development of projects and a high priority is placed on preventing problems through planning. Stringent standards for environmental protection are required to ensure that generation of contaminants and their release to the environment are minimized.

Another key responsibility of the service is monitoring the environment, principally air, water, soil, wastes and pesticides, to ensure standards are followed and that environmental quality is maintained. Where necessary, enforcement activities are carried out to ensure compliance with standards. Research activities focus on finding applied solutions for environmental problems.

The service administers grants to local authorities developing regional waste management facilities and non-profit organizations establishing recycling centres.



ENVIRONMENTAL ASSESSMENT DIVISION

The Environmental Assessment Division is responsible for the detailed evaluation of major resource development initiatives through the environmental impact assessment (EIA) review process.

EIAs are required for most major resource developments such as new oil sands mining projects, sour gas processing plants, coal mining projects, power plants, refineries and petrochemical facilities, recreational developments, and water resource projects.

The division facilitates public participation in environmental issues and in programs administered by Alberta Environment.

It administers restricted development area (RDA) regulations which designate transportation utility corridors and areas requiring special environmental protection.

Planning, development and co-ordination of departmental programs for monitoring ambient air and water quality are undertaken by the division. In addition, it develops and recommends ambient objectives for chemicals in air, water, soil and sediment.

Environmental Impact Assessment Review Branch

This Branch evaluates proposals to determine whether Environmental Impact Assessment (EIA) reports are needed, determines the scope and content of EIA documentation and co-ordinates the interdepartmental review of these projects.

During the 1989/90 fiscal year, the branch dealt with a total of 95 project reviews,of which 79 were new referrals (Table 6), and 16 were carried over from the previous year. Three EIA reviews were completed and 16 projects are still proceeding through the various stages of the environmental assessment process.

A total of 57 project reviews were completed. Thirty-one are still active and seven are inactive.

A major branch undertaking was the co-ordination of Alberta Environment activities at the public hearings conducted by the Alberta-Pacific EIA Review Board. The branch also participated in the public review of the provincial EIA review process.

The branch assisted the director of the division in the co-ordination of EIA reviews with the federal government. Through this branch, the director exchanged information with Environment Canada on a number of projects which have interjurisdictional environmental implications.

Community Affairs Branch

The branch is responsible for facilitating public involvement in departmental projects and regulatory procedures.

Environmental Impact Assessment: Communities were assisted through responses to information requests and advice on environmental issues and the regulatory process. Branch staff advised proponents on the requirements for public participation programs and monitored programs for conformity to the intent of the environmental impact assessment (EIA) guidelines on public involvement.

The branch responded to requests from individuals and community groups planning to intervene at Energy Resources Conservation Board hearings where an EIA was required as part of the proponent's application. Branch staff were involved in EIAs related to pulp mills, and transportation projects as well as gas, coal and tarsand developments. The branch played a major role in the Alberta-Pacific EIA Review Board process including secretariat support to the Review Board as well as handling all requests for intervenor funding. Activities associated with the Alberta-Pacific project demanded a considerable amount of the branch's staff and fiscal resources for 1989-90.

Departmental Projects: Branch staff aided citizen participation in many departmental water resource projects.

The Department's Help End Landfill Pollution (HELP) Program was assisted by branch staff on community approaches at orphan sites. Assistance in designing and implementing public consultation programs for licensing was provided to other divisions in the Environmental Protection Service.

The branch worked with a number of community groups on a variety of environmental issues. Some of these organizations include the following: Fort McKay Interface Committee, Oldman River Dam Local Advisory Committee,

Alberta Coalition for Forest Spray Alternatives, Procter and Gamble's Environmental Advisory Committee, Friends of the Peace Environmental Association, and The Alberta Environmental Network.

A considerable contribution was made by branch staff to the organizing and implementing of Environment Week Activities throughout the province, including the expansion of the Environment Week tour to nine centres.

Standards, Research and Development Branch

The Standards, Research and Development Branch develops provincial ambient guidelines and objectives for chemicals and traditional parameters in environmental media (air, water, and soil/sediments).

Further revisions were made to the document "A Proposed Approach to Setting Ambient Objectives in Alberta," paying particular attention to the public involvement procedure. The draft document was finalized in March 1990.

A candidate list of pollutants of concern to Alberta was prepared, a ranking procedure developed, and a preliminary list of chemicals was drawn up in order of importance.

The branch initiated the procedure to develop ambient objectives for dissolved oxygen, mercury, and ethylene. A contract with the Alberta Research Council led to the report "Assessment of information for an ambient hydrocarbon standard to ensure acceptable ozone levels in Alberta." The branch chaired a committee to evaluate information and co-ordinated the completion of the report "A review of approaches for setting acid deposition limits in Alberta."

In co-operation with the Canadian Council of Ministers of Environment (CCME), the branch hosted and managed a workshop on "Risk Assessment as an Environmental Management Tool." The workshop, held in Calgary, was attended by 70 environmental engineers, scientists, and administrators from across Canada.

Environmental Quality Monitoring Branch

The Environmental Quality Monitoring Branch (EQMB) collects, analyzes, assesses and reports the ambient air and water quality conditions in support of the department's regulatory and protective mandates. The branch's integrated and multidisciplinary programs provide reliable environmental quality data to protect air and water quality, and to describe background conditions and assessments in support of licensing and other regulations.

The Branch has three sections: Water Quality, Data Management, and Air Quality.

Water Quality:

Surface water quality programs conducted by the Branch in 1989-90 fell into three categories: ambient water quality surveys, ambient long-term monitoring, and impact assessments.

Seven lake survey programs were conducted in 1989-90. A co-operative program between Alberta Environment and Alberta Recreation and Parks resulted in 22 lakes being sampled. Another program, operated in co-operation with the Alberta Association of Summer Villages, trained members of the general public in basic lake sampling techniques to increase public awareness of lake water quality. Skeleton, Buffalo, and Capt. Eyre Lakes were successfully sampled in this Volunteer Citizens' Lake Survey Program.

At the request of the Eastern Irrigation District, an evaluation of Crawling Valley Reservoir was undertaken. A detailed stream and lake water quality evaluation was carried out at Pine Lake and a lake stabilization study was undertaken at Lac La Biche. Winagami Lake and the South Heart Reservoir were evaluated and six other lakes (Goose, Muriel, Lac La Nonne, Bonnie, Sandy, and Gull) were also sampled.

Several major river survey and impact assessment programs were conducted in 1989-90. A basin overview program was conducted on the Battle River. A pilot program to develop and review methodologies for multi-media contaminant sampling was also implemented on the Battle River. A second year of study was conducted on the Elbow River.

Extensive work was carried out in northern river basins to evaluate existing industrial impacts and to facilitate regulatory and licensing activities within the department with respect to new pulp mills.

The discovery of creosote contamination in the Bow River at Calgary prompted a major departmental investigation, including continuous surveillance by EQMB for polycyclic aromatic hydrocarbon contaminants. As well, the Bow River was surveyed to determine conditions with respect to continued phosphorus removal at Calgary's sewage treatment plants. Ethel, Wabamun, Nakamun, and Baptiste Lakes, have been sampled monthly since 1980 to monitor long-term trends in specific trophic variables. Legend lake in the Birch Mountain Uplands was added in 1989.

An extensive long-term river network has been in place since the 1960s and in 1989-90, there were 13 active stations being sampled at monthly intervals. A medium-term network consisting of seven stations was added to the northern basins to provide an extended data base during the period of increased pulp mill development.

New Prairie Provinces Water Board water quality objectives were negotiated on behalf of Alberta through the Committee on Water Quality. A detailed study design to evaluate the effects of stormwater runoff from the City of Edmonton into the North Saskatchewan River was completed. A major consolidation of lake water quality data into the "Atlas of Alberta Lakes" continued to be co-managed between EQMB and the University of Alberta. Numerous lake and river reports were produced, and scientific reviews were conducted on a wide range of EIAs, licensing reports and departmental initiatives.

Data Management:

Data Management maintains the branch's environmental databases and provides data retrieval and statistical analysis services. A large part of the work involves distributing air and water quality monitoring data. The size of the data requests varies from individual citizens interested in specific locations, to consulting companies working on air quality in northern Alberta or water quality for entire drainage basins.

During the past year there was increased interest in monitoring data, especially in electronic form. To meet this need, the section modified some of its databases to provide compact electronic data formats. It was heavily involved in the planning of an integrated information system to access licensing, enforcement and monitoring data.

Air Quality:

Urban Air Quality Monitoring

The air quality monitoring network for Edmonton and Calgary consists of continuous monitoring stations and static monitors. Three permanent fixed continuous stations are located in Edmonton and Calgary. An air quality index (IQUA) based on levels of the most significant air pollutants (smoke, nitrogen dioxide, carbon monoxide, ozone and sulfur dioxide) was released twice daily to the media and the public. The static monitoring network consists of 40 total sulfation stations, 32 dustfall stations, three fluoride stations and six high-volume samplers.

The monitoring network for smaller urban centres consists of one high-volume sampler, 33 total sulfation, 18 hydrogen sulfide, 21 dustfall and one fluoride exposure cylinder stations. A fixed continuous multi-parameter station is located in Fort Saskatchewan.

Rural Air Quality Monitoring

Fixed continuous multi-parameter monitoring stations are operated in Fort McMurray and Fort McKay. A network of 148 hydrogen sulfide, 152 total sulfation, 19 dustfall and four fluoride exposure cylinder stations were maintained near rural industrial operations. An air pollution meteorological monitoring station was operated near Fort Saskatchewan to provide boundary layer data acquisition.

Monthly precipitation samples were collected and analyzed at 13 locations as part of an assessment of acid deposition in Alberta.

A special study for suspended particulate matter was conducted in the town of Drayton Valley in response to concerns expressed by local residents.

Land Use Branch

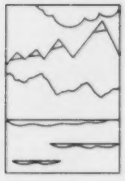
The Department of the Environment Act provides for the designation of restricted development areas (RDAs) in the province. The RDA designations meet the need for special environmental management in certain areas and protect transportation/utility corridor lands. Ten RDAs are administered by the Land Use Branch.

Most proposed land-use changes are reviewed to determine whether they conform to the regulations set up for a specific RDA and ministerial consent is required before there can be any change in land use. During the past year, 202 requests for ministerial consent were received; 173 were approved, one refused, and five did not require consent (Table 7).

The branch provides comments to local planning authorities throughout the province. Applications for changes in land use and subdivision are referred to the branch from a number of sources.

The branch provides comments on such issues as flood susceptibility, bank and slope stability, erosion, surface drainage, ground water availability, potential air and water pollution and suitability of the soil for onsite sewage disposal.

In 1989-90 a number of major residential and industrial developments were reviewed as were a number of major recreational developments. The number of applications processed increased from 1,712 in the previous year to 1,948 (Table 8).



STANDARDS AND APPROVALS DIVISION

This division is responsible primarily for the review of industrial and municipal applications for Permits to Construct and Licences to Operate new and/or existing facilities in accordance with The Clean Air Act, The Clean Water Act and their regulations. Permits are issued for new facilities and for alterations to existing operations once the division is satisfied with the proposed environmental protection program. The division also establishes drinking water standards. In addition the division is responsible for amendments to acts and regulations, development of source emission objectives and standards, the review of licenced source and ambient monitoring reports and follow-up action (abatement), the monitoring of a number of effluent discharges, the delivery of a field services program and operator training programs.

Air Quality Branch

The Air Quality Branch seeks to achieve and maintain acceptable ambient air quality through the use of the Clean Air Act and regulations, guidelines, and policies applied to industrial and other commercial operations.

Branch staff assess proposals and issue approvals for the design, construction and operation of industrial facilities and other operations. The branch initiates and participates in studies and developments which determine and lessen the impact of industrial emissions on air quality in the province. The assessment of existing industrial operations, monitoring reports and applications and past performance prior to re-licensing were also a major part of the total workload for the year.

A total of 118 permits and 328 licences were issued under The Clean Air Act during the year (Table 9). In addition, a total of nine amendments to permits and 207 amendments to licences were issued.

Staff continued to participate in Energy Resources Conservation Board (ERCB) hearings and inquiries and the branch was active on committees dealing with acid rain causing emissions. Branch staff continued to participate in the ART process for the OSLO oil sands project, the DART process for the Suncor de-bottlenecking project and also participated on the Fort McMurray Regional Air Quality Co-ordinating Committee (RAQCC). Branch participation also continued on the Government Industry Consultative Committee on Flaring (GICCOF) which completed two flaring studies on current technology and current practice.

The branch was involved in the review of several pulp mill developments and considerable staff effort was put into the Alberta-Pacific Environmental Impact Assessment review and participation in the public hearings.

With Environment Canada, staff assisted in the development of the draft national NOx/VOC Management Plan which was released in March by the Canadian Council of Ministers of the Environment (CCME). Also in March, the Alberta Government announced it would carry out a broadly-based, public consultation process called the Clean Air Strategy for Alberta (CASA). CASA is jointly managed by Alberta Energy and Alberta Environment.

Water Quality Branch

The Water Quality Branch seeks to maintain acceptable quality for Alberta's surface and ground waters by regulating and monitoring pollution sources. Branch staff assess proposals and issue approvals for the design, construction and operation of industrial facilities and other operations. The branch also inspects industrial plants and monitors their discharges.

Considerable staff effort is devoted to assessing new and existing industrial plants and operations to ensure that they are environmentally acceptable. A total of 69 permits and 350 licences were issued for the construction and operation of new and existing industrial facilities (Table 10). Thirty letters of permission were issued for specific one-time events, the most common being studies of rate of flow and mixing characteristic of rivers.

Review of continuing and recent pulp and paper industry development proposals required a major concentration of branch activity in the development of standards and assessing the impact on water quality. Intensive wasteload allocation modelling was continued for the Athabasca and Peace River systems. Follow-up on groundwater contamination at existing and new industrial sites with particular emphasis on eliminating sources required staff's concentrated effort.

During the year, branch staff co-ordinated reviews of existing industrial facilities to determine the impact of operations on surface and groundwater quality and to identify necessary areas of improvement.

River basin planning studies, new industrial processes research and wastewater treatment technologies were

undertaken as well. The branch also continued review and updating of existing industrial performance guidelines. Extensive work was carried out developing standardized licences and permits that not only cover the technical aspects of environmental protection which are legally enforceable.

The branch participated in the environmental impact assessment review process for all industrial projects that could have an effect on surface or groundwater. Staff contribution at this pre-design stage enabled introduction of the most appropriate and beneficial environmental controls, practices and technology.

Municipal Branch

Safe drinking water and environmentally sound treatment and disposal of sewage are two major goals of the Municipal Branch. These goals are pursued through standards and guidelines development, approval of all municipal waterworks and wastewater projects, licensing the operation of treatment facilities, inspection and monitoring of these facilities, and training and certification of water and wastewater treatment plant operators.

The continuing development and updating of standards and guidelines is an essential part of ensuring safe drinking water and proper wastewater treatment and disposal. The branch continued its study of risk assessment/risk management in relation to municipal and industrial approvals. Branch staff also maintained a high profile in the organization of and participation in technical conferences, seminars and municipal conventions. Once again, the branch was active in Environment Week '89, co-ordinating the 1989 Drinking Water Challenge.

The review of waterworks, wastewater and stormwater drainage projects for Permits to Construct under the Clean Water Act legislation is a major continuing activity of the branch, as is issuing or renewing Clean Water Act Licences to Operate for waterworks and wastewater treatment facilities. The branch also continued to control chemicals and products used in waterworks systems by issuing "No Objection to Use" letters and Letters of Permission to municipalities.

During the 1989/90 fiscal year, 345 Permits or amended Permits to Construct and 167 new or renewed Licences to Operate were issued for waterworks and wastewater systems. In addition to these approvals, 33 letters of "No Objection to Use" were issued to manufacturers and distributors of water treatment chemicals. Sixty-seven letters of Permission (including amendments) were issued for projects involving sludge land application, wastewater irrigation, and experiments to evaluate new water treatment chemicals or treatment technologies (Table 11).

Reviewing the monthly and annual reports required as part of the Licences to Operate for waterworks and wastewater systems, field inspections, and monitoring programs are major responsibilities of the branch. In 1989/90, the Municipal Branch continued its various routine drinking water and sewage monitoring activities. A screening project was initiated with a number of communities downstream of pulp mills using the parameter "AOX" (adsorbable organic halides) as a surrogate for possible impacts on drinking water quality.

Dioxin testing in drinking water was performed in the Bow-South Saskatchewan River System downstream of Calgary as part of a larger departmental investigation. The effectiveness of rapid screens (i.e. Coli-lert) to replace traditional methods of bacteriological testing of drinking water was investigated, and the suitability of certain commercially available equipment in field testing for fluoride and manganese in drinking water was evaluated.

The branch's wastewater effluent monitoring program was also maintained. Effluents from larger municipalities were monitored as part of a regular "splitting of samples" program with these municipalities. Of particular note was the follow-up support provided by both the Pollution Control Division (PCD) and the City of Lethbridge in regard to that city's non-compliance with their sewage licence.

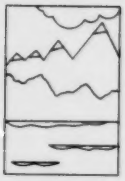
Administration and delivery of a Certification Program and a Training Program for municipal water and wastewater operators continued to be a major responsibility of the Municipal Branch. The branch has responsibility for the Operator Certification Program and also delivers an Operator Training Program.

The Certification Program is widely accepted by the municipal employees who operate the water treatment, wastewater treatment, water distribution and wastewater collection facilities in Alberta. It is the first mandatory program of its type in Canada.

During the 1989-90 fiscal year, 350 individuals qualified for initial certification or certification upgrading. Under the program, 1,432 operators are now certified.

The Training Program provided at least one training opportunity for each of the 570 municipal operators, helping them to achieve certification and operate their plants to produce better quality drinking water and/or sewage effluents.

A Program Review document examined existing programs and a series of scenarios on potential development.



WASTES AND CHEMICALS DIVISION

Industrial Wastes Branch

The branch administers the Hazardous Chemicals Act and associated regulations as they apply to the management of hazardous wastes.

The branch also manages, partially or totally, projects in the areas of industrial waste management, decommissioning and clean-up of industrial plant sites and the co-ordination of Alberta Environment's input into approval processes for sanitary and municipal landfills. Assistance is also provided to federal/provincial committees set up under the auspices of the Canadian Council of Ministers of Environment (CCME) to establish national policies on waste management.

Current major programs are as follows:
Hazardous Waste Management: The branch ensures that the Hazardous Waste Manifest Program provides accurate and timely information on compliance with requirements for tracking hazardous waste shipments and that the program produces information on hazardous waste inventories in Alberta. More than 10,000 manifest applications/submissions and 2,500 identification number applications (generators, carriers and receivers) are received and processed annually.

In addition, the branch provides consultative services and seminars to industry, government agencies and the public on Alberta Environment's hazardous waste management programs, policies and legislation.

Review of permit and licence applications for hazardous waste storage, treatment and disposal facilities, and drafting appropriate approvals under the Clean Air Act and Clean Water Act are also important components of this program.

Industrial Waste Management: The branch inspects industrial plant sites and acts as the licensing group under provisions of the CWA on matters related to industrial solid waste management. Services range from providing advice and recommendations to the Standards and Approvals Division and the Energy Resources Conservation Board on various proposals to reviewing and drafting approvals for applications regarding land treatment and disposal, including deepwell injection, of industrial wastes.

In 1989, in support of this approving role the branch inspected approximately 70 facilities and provided comments, reviews or draft approvals for approximately 250 applications/projects.

The branch also provides assistance to industry, consultants and other government agencies by assessing the suitability of analytical protocols and storage, treatment and disposal technologies as they apply to industrial waste management.

Waste audits of industrial sectors not licensed under the Clean Water Act and the Clean Air Act but generating small quantities of industrial/hazardous wastes were conducted to assess and enhance current waste management practices. Within this program the branch inspected approximately 250 small industrial and service shops.

Decommissioning: Guidance is provided to industry and other government agencies on the clean-up and decommissioning of industrial plant sites. The review and approval of sites assessments and remediation plans are required to return sites contaminated as a result of industrial activities to a productive use. Approximately 20 of these such studies were reviewed by the branch.

Pesticide Management Branch

This branch provides environmental protection through a comprehensive pesticide management program that embraces five broad areas: a) certification, licencing; b) issuing and monitoring of permits for the use of restricted pesticides, and the use of pesticides in environmentally sensitive areas; c) enforcement of the Agricultural Chemicals Act; d) administration and co-ordination of technical and financial assistance programs; and e) education and liaison.

To improve service delivery of the branch's programs, activities were consolidated and reorganized. The Northern Alberta Section is responsible for the licencing and certification programs, the Green Area Permit program, and environmental monitoring. The Southern Alberta Section is responsible for the aquatic permit and restricted permit programs, and the Biting Fly Control Financial Assistance Program. A third section administers the branch's investigation and enforcement activities.

Certification and Licencing: The home study programs, offered by Lakeland College (Vermilion Campus), continued to form the principal route of examination preparation for both pesticide applicators and dispensers.

The branch processed approximately 230 pesticide applicator examinations, 600 pesticide applicator licences, 173 pesticide

dispenser certificates, and 661 vendor licences. The branch maintains a total licensing system comprised of approximately 1,600 pesticide applicators, 2,163 pesticide dispensers, and 421 pesticide vendors (covering approximately 1,000 outlets).

Permits and Monitoring: A total of 655 permits were issued by the Pesticide Management Branch. Some 110 permits were issued for the application of pesticides in the Green Area. Seven experimental forestry herbicide permits were issued. A total of 255 permits were administered for the application of pesticides in, on, or near water, and 252 permits were issued for the application of restricted pesticides. For biting fly control, 35 permits were issued.

The branch participated in two aquatic plant management studies for control in irrigation ditches and dugouts.

The branch continued to monitor municipal pesticide container collection sites. A total of 120 compliance inspections were conducted.

The branch assisted in a Canada-wide groundwater well sampling program in potentially sensitive areas to determine whether there were any significant herbicide residue levels in potable water wells. Pesticides were detected in only one of the 52 wells sampled.

Enforcement: The Pesticide Management Branch has developed a Compliance Section and regional inspectors conducted 172 investigations into suspected contraventions of the Agricultural Chemicals Act and its Regulations. In response to these investigations, 25 Letters of Compliance, one Control Order, and three Stop Orders were issued.

The branch also conducted 1,056 retail and 60 wholesale pesticide vendor inspections and 232 licenced pesticide applicator inspections. Following these inspections 226 Letters of Compliance were issued to vendors, which resulted in the suspension of 51 licences.

Technical and Financial Assistance Programs:
Biting Fly Control Financial Assistance Program: Grants totalling $486,500 were awarded to 31 municipalities (total population 2.41 million Albertans) which participated in this program in 1989. Section staff conducted approximately 70 inspections of active control programs, and advised or attended meetings to discuss mosquito control and financial aid with several other interested communities.

A mosquito biology workshop for municipal control program staff to upgrade their technical knowledge was held at the University of Calgary. In addition, department staff provided a training course at Olds College for Department of National Defence personnel.

Pesticide Container Disposal Program: The clean-up of 1987 and 1988 containers was completed in July, 1989. The Alberta Special Waste Management Corporation managed removal of the 1989 containers from 98 sites in the province. Funds for the clean-up were provided by the Crop Protection Institute of Canada. The upgrading of 31 container sites was completed. A Pesticide Container Disposal Committee was formed to monitor the progress of the program and explore recycling options for the metal and plastics.

Education and Liaison: The Pesticide Management Branch develops educational materials and presentations made to pesticide user groups, and the general public. Recently, the branch prepared several new brochures as well as a fact sheet on prevention of water contamination. In co-operation with the Education Branch, a series of pesticide education modules are being prepared for use in the junior and senior high school science curriculum.

Recycling Branch

This branch promotes and encourages waste reduction and recycling strategies to protect the environment and conserve resources. The 4R's of waste management - Reduce, Reuse, Recycle, and Recover - are promoted through three main program areas: residential/light commercial; industrial; and public information.

The interest in waste minimization and recycling by the public, industry, and municipal governments has increased the demand for general and technical information.

A video, "Great Expectations: Recycling in Alberta" was produced and shown on the ACCESS Network; a waste management handbook "Saving the World Begins at Home" and several waste minimization and recycling fact sheets were published. The staff made presentations on waste reduction and recycling to numerous community associations, industry workshops, and other interested groups.

As well, staff assisted in drafting Alberta's Comprehensive Waste Minimization/Recycling Strategy.

The Recycling Branch has worked closely with industry on developing waste reduction and recycling strategies. For example, the branch assisted the National Packaging Task Force and established the Western Canadian Scrap Tire Task Force.

Involvement with community recycling projects continued. In 1989/90, the Resource Recovery Grant Program provided funding of $570,357 to 20 recycling projects. Grants ranged from $2,575 to $81,750 for recycling feasibility studies, education projects, a unique community compost program in

Ryley, and an office paper recycling program in Edmonton. A number of community recycling projects were funded as well.

Soil Protection Branch

The Soil Protection Branch addresses soil issues related to the regulatory functions of Alberta Environment with the intent of protecting, improving, and promoting the wise use of our soil resource. Major branch programs relate to land spreading of wastes, reclamation of industrially impacted land, soil effects from acidic deposition, and soil and groundwater laboratory support for these programs.

Land Spreading of Municipal and Industrial Wastes: Municipal and industrial wastewater and sludge characterization, and investigations into the suitability of land spreading such wastes, continue as a major branch activity. The aim is to use the soil-plant system to degrade, transform and assimilate qualifying wastes while not degrading the soil resource, or injuring human health and the environment.

The cities of Calgary and Edmonton continued their annual programs of applying sewage sludge to agricultural land. Calgary initiated a study to address nitrogen loading management associated with its program. Studies were also undertaken for some 10 other communities to determine the suitability of their sewage sludge and land for sludge application. Spreading restrictions were identified for the feasible schemes, and incorporated into the permits issued by the department for waste spreading on land-schemes.

Most of the industrial wastes being assessed for land application are from the oil and gas or agricultural processing industries, and recently, to a limited extent, the forest products processing industry. Progress in the revision of drilling waste management and disposal guidelines through government-industry efforts has been marked by the preparation of draft documents addressing drilling wastes characterization, drilling wastes disposal criteria and management options. Efforts are now focusing on the sampling and anlyses of representative drilling wastes to assess the need for refinements to the draft criteria and recommendations.

The evaluation of biological toxicity testing techniques applied as an approach to economic characterization of industrial wastes and the screening of industrial wastes for suitability for land application has continued through a government-industry provincial committee.

Industrial Site Reclamation: As a co-developer of the national industrial site decommissioning guide, expected to be publicly available in the fall of 1990, Alberta subscribes to a 2-tier approach to setting contaminated soil remediation criteria. Tier I values are generic and approximate acceptable concentrations of soil contaminants for all site conditions and land uses without defining site-specific risk, whereas Tier II values are site-specific concerning protection of human health and the environment. The branch has developed a draft of Tier I remediation criteria to be used with the national guide. Tier II values, being site-specific, are proponent developed with the help of risk-based predictive models.

Development of criteria and accompanying risk assessment procedures for acceptable contaminant concentrations of gasoline and diesel fuel in soil and groundwater were completed through the Management of Underground Storage Tanks (MUST) project. The finalized criteria document and user's handbook have undergone industry review and are in the process of government department review.

Assessment of biological techniques for the remediation of contaminated soil and groundwater was initiated through a recently formed international industry-government committee. Work to date has concentrated on the identification, formulation and review of studies needed to clarify subject status and meet recognized information needs.

Soil Acidification: Activities relating to acid deposition effects on soil focussed primarily on monitoring, identifying and outlining outstanding soil acidification research needs, primarily relating soil acidification predictive modeling of inorganic and organic soils.

Alberta continued its long-term soil monitoring program to evaluate impacts on non-agricultural soils in areas where deposition of acid precursors are expected.

Soil monitoring quality assurance was continued in support of Alberta Environment's requirement that sour gas plants monitor surrounding soils for acidification.

Analytical Support: Laboratory analyses of soil, waste, plant and waste materials were conducted in support of the division's programs. Some 4,700 samples were analyzed for about 68,300 measurements. Of these, about 41,500 and 26,800 measures were made on 3,000 soil and 1,700 water samples, respectively.

Groundwater Protection Branch

The main responsibility of this branch is to ensure that the impact of human activities on groundwater is within acceptable limits. Another major responsibility is to ensure that those responsible for unacceptable groundwater contamination undertake appropriate reclamation. These responsibilities are accomplished through the branch's advisory role to other areas within the department which administer the relevant legislation. Programs currently undertaken by the branch include Help End Landfill

Pollution (HELP), Management of Underground Storage Tanks (MUST), review of deepwell injection, hydrogeological cross-sections, landfill investigation and monitoring, industrial plant monitoring and high quality water sampling. In addition to these, branch staff members were involved in numerous groundwater contamination investigations, review of subdivision referrals and sewage lagoon proposals, and sampling and testing of pesticide container storage sites.

Help End Landfill Pollution (HELP): The project was initiated in September 1986 in response to concerns about past industrial waste disposal practices. The purpose of the project is to inventory, assess and if necessary, clean up former orphan industrial landfills and plant sites in Alberta.

A total of 682 sites were inventoried, and 13 abandoned "orphan" sites were identified as requiring investigation to determine whether there are potential threats to human health and the environment.

Detailed site investigations were completed at 12 orphan sites to determine the nature and extent of contamination and evaluate remediation options. The most important orphan site was Canada Creosoting Limited, a large wood preserving plant which operated from 1932 to 1962 near downtown Calgary. The extent of soil and groundwater contamination by wood preserving chemicals was established and a preliminary risk assessment completed. Emergency action initiated when creosote product was detected in the Bow River adjacent to the site, involved recovery of the product, construction of a berm to contain it and implementation of a Bow River water quality monitoring program.

Initial investigation(s) at each orphan site include risk assessment and risk management plans to ensure protection of the environment and human health. At three sites immediate action was taken to manage obvious hazards.

Management of Underground Storage Tanks (MUST): The MUST Project is a joint undertaking between Alberta Environment and Alberta Labour addressing problems related to underground storage tank systems. Specifically, the project seeks to reduce the frequency and magnitude of leaking underground storage tanks systems; address problems associated with abandoned underground tanks; and develop an improved management system for underground storage tanks.

The project team has continued to meet with industry, private tank owners/operators and other regulatory jurisdictions to present the project objectives and to solicit their support. An information tracking system has been developed to manage tank site information and equipment upgrading programs. The project team is developing technical and environmental guidelines covering a range of tank management concerns.

Deepwell Injection: All deepwell injection applications for underground storage of gas and industrial waste disposal and those applications for the return of produced water, through wells less than 600 metres in depth, are referred to Alberta Environment by the Energy Resources Conservation Board (ERCB) for Ministerial Approval. The referral procedure ensures that the deepwell injection schemes are carried out in a manner which will not endanger the environment, especially the groundwater resources. Over 30 referrals from the ERCB have been reviewed, and the number is increasing dramatically as a result of enhanced regulatory requirements.

Hydrogeological Cross-Sections: As part of the continuing "Base of Groundwater Protection" mapping project, hydrogeological cross-sections traversing Alberta are being prepared. Forty-five hydrogeological cross-sections have been completed for distribution and another 29 are in final preparation for printing. Cross-sections covering most of the settled areas of the province have been constructed, and continued mapping will address the remaining settled regions and areas of oil industry activity.

The Energy Resources Conservation Board (ERCB) has recently revised the guidelines for casing and cementing requirements to address concerns regarding groundwater protection. In areas of limited mapping or where a discrepancy between previous and present guidelines exists, the inquiry is referred to the Groundwater Protection Branch by the ERCB. Response to the project has been very favourable. The branch received more than one hundred requests from the oil industry and the ERCB about the depth of groundwater protection prior to well abandonment and/or new drilling.

Landfill Investigations: Preliminary hydrogeological investigations at prospective regional and modified landfills were continued as a service to local authorities. Investigations are conducted to ensure that landfills are located in areas where the risk of groundwater contamination is low. In the landfill site selection process, hydrogeologic constraint maps, office evaluations, and site specific hydrogeologic testing are employed. A total of 67 landfill evaluations were undertaken in response to applications for 17 regional and 10 modified landfill sites. An additional 19 industrial landfill applications were reviewed.

Permanent groundwater monitoring systems have been established at 19 regional and two modified landfills. Monitoring activities typically consist of recording water levels and collecting groundwater samples for chemical analyses. Monitoring results for each regional landfill are reported annually.

Industrial Plant Monitoring: Branch personnel provided technical assistance to regulatory authorities in the evaluation of groundwater monitoring proposals and data from industrial

plants. In the past year, groundwater monitoring proposals and/or monitoring data were reviewed for over 70 industrial plants.

High Quality Water Sampling: A province-wide groundwater quality monitoring project was started in 1985 to determine the natural groundwater quality of specific aquifers using a strict sampling protocol.

This year a total of 74 wells were sampled including 35 sampled the previous year. Duplicate sampling is required to ensure the results represent true natural groundwater quality.

Sewage Lagoons: Twenty-eight proposals for municipal sewage lagoon siting and construction were assessed. In addition, staff conducted several inspections regarding seepage complaints and held technical meetings with design consultants. Currently five lagoon and reservoir sites are instrumented to detect seepage.

Hydrocarbons: More than 130 gasoline-related incidents were dealt with during the year. These included on-site investigations, reports, clean-up supervisions, sampling and testing, inventory audits, court testimony and meetings with various fire departments.

Groundwater Contamination: More than 20 groundwater contamination-related events were handled during the year, including responses to domestic water well quality problems, municipal and industrial landfill siting concerns, municipal landfill reclamation studies and industrial spill-related events.

Wastewater Irrigation Site Suitability Assessments: This program is a site investigative service provided to the Standards and Approvals Division to assist the division in granting/assessing permits for sites to use irrigation as a means of wastewater disposal. Under this program, 15 sites were evaluated. Of these, eight were approved for development.

Waste Assistance Branch

This branch has responsibility for two specific programs, the Waste Management Assistance Program and the Beverage Container Recovery Program.

Waste Management Assistance Program: Since 1976, this program has provided capital funds and technical assistance to regional municipal waste management services.

There are 25 Regional Waste Management Systems operating in Alberta which use 129 solid waste transfer stations, 20 regional sanitary landfills and one private sanitary landfill for municipal solid wastes. These facilities have replaced approximately 193 old dump sites. Two regional sanitary landfills are licenced as Class II Industrial Landfills and are able to accept solid hazardous wastes that are not prohibited from landfill disposal.

One new regional system started operation in 1989/90. Four systems were at various stages in their construction and three new systems received initial grant payments. The program provided $2.78 million to seven Regional Waste Management Authorities.

Feasibility studies were conducted for eight regions in the 1989/90 fiscal year.

Beverage Container Recovery Program: Alberta's beverage container recovery system, in operation for 18 years, provides a recycling alternative to landfilling containers.

There are 208 beverage container depots operating in the province (49 urban and 159 rural). Fifty-four depot applications were reviewed, resulting in approvals to operate issued for 39.

Changes made to the Beverage Container Act and Regulation in January 1989 required beverage manufacturers and distributors to register the products they sell with Alberta Environment. This resulted in contact with 100 manufacturers and distributors to determine the presence of 7,451 registered products; of these, 4,891 are Alberta Liquor Control Board products. Beverage container depots are continuously informed of the containers they must accept.

Deposits on beverage containers were simplified so that containers one litre or less require a deposit of five cents and those more than one litre of 20 cents.

Pollution (HELP), Management of Underground Storage Tanks (MUST), review of deepwell injection, hydrogeological cross-sections, landfill investigation and monitoring, industrial plant monitoring and high quality water sampling. In addition to these, branch staff members were involved in numerous groundwater contamination investigations, review of subdivision referrals and sewage lagoon proposals, and sampling and testing of pesticide container storage sites.

Help End Landfill Pollution (HELP): The project was initiated in September 1986 in response to concerns about past industrial waste disposal practices. The purpose of the project is to inventory, assess and if necessary, clean up former orphan industrial landfills and plant sites in Alberta.

A total of 682 sites were inventoried, and 13 abandoned "orphan" sites were identified as requiring investigation to determine whether there are potential threats to human health and the environment.

Detailed site investigations were completed at 12 orphan sites to determine the nature and extent of contamination and evaluate remediation options. The most important orphan site was Canada Creosoting Limited, a large wood preserving plant which operated from 1932 to 1962 near downtown Calgary. The extent of soil and groundwater contamination by wood preserving chemicals was established and a preliminary risk assessment completed. Emergency action initiated when creosote product was detected in the Bow River adjacent to the site, involved recovery of the product, construction of a berm to contain it and implementation of a Bow River water quality monitoring program.

Initial investigation(s) at each orphan site include risk assessment and risk management plans to ensure protection of the environment and human health. At three sites immediate action was taken to manage obvious hazards.

Management of Underground Storage Tanks (MUST): The MUST Project is a joint undertaking between Alberta Environment and Alberta Labour addressing problems related to underground storage tank systems. Specifically, the project seeks to reduce the frequency and magnitude of leaking underground storage tanks systems; address problems associated with abandoned underground tanks; and develop an improved management system for underground storage tanks.

The project team has continued to meet with industry, private tank owners/operators and other regulatory jurisdictions to present the project objectives and to solicit their support. An information tracking system has been developed to manage tank site information and equipment upgrading programs. The project team is developing technical and environmental guidelines covering a range of tank management concerns.

Deepwell Injection: All deepwell injection applications for underground storage of gas and industrial waste disposal and those applications for the return of produced water, through wells less than 600 metres in depth, are referred to Alberta Environment by the Energy Resources Conservation Board (ERCB) for Ministerial Approval. The referral procedure ensures that the deepwell injection schemes are carried out in a manner which will not endanger the environment, especially the groundwater resources. Over 30 referrals from the ERCB have been reviewed, and the number is increasing dramatically as a result of enhanced regulatory requirements.

Hydrogeological Cross-Sections: As part of the continuing "Base of Groundwater Protection" mapping project, hydrogeological cross-sections traversing Alberta are being prepared. Forty-five hydrogeological cross-sections have been completed for distribution and another 29 are in final preparation for printing. Cross-sections covering most of the settled areas of the province have been constructed, and continued mapping will address the remaining settled regions and areas of oil industry activity.

The Energy Resources Conservation Board (ERCB) has recently revised the guidelines for casing and cementing requirements to address concerns regarding groundwater protection. In areas of limited mapping or where a discrepancy between previous and present guidelines exists, the inquiry is referred to the Groundwater Protection Branch by the ERCB. Response to the project has been very favourable. The branch received more than one hundred requests from the oil industry and the ERCB about the depth of groundwater protection prior to well abandonment and/or new drilling.

Landfill Investigations: Preliminary hydrogeological investigations at prospective regional and modified landfills were continued as a service to local authorities. Investigations are conducted to ensure that landfills are located in areas where the risk of groundwater contamination is low. In the landfill site selection process, hydrogeologic constraint maps, office evaluations, and site specific hydrogeologic testing are employed. A total of 67 landfill evaluations were undertaken in response to applications for 17 regional and 10 modified landfill sites. An additional 19 industrial landfill applications were reviewed.

Permanent groundwater monitoring systems have been established at 19 regional and two modified landfills. Monitoring activities typically consist of recording water levels and collecting groundwater samples for chemical analyses. Monitoring results for each regional landfill are reported annually.

Industrial Plant Monitoring: Branch personnel provided technical assistance to regulatory authorities in the evaluation of groundwater monitoring proposals and data from industrial

plants. In the past year, groundwater monitoring proposals and/or monitoring data were reviewed for over 70 industrial plants.

High Quality Water Sampling: A province-wide groundwater quality monitoring project was started in 1985 to determine the natural groundwater quality of specific aquifers using a strict sampling protocol.

This year a total of 74 wells were sampled including 35 sampled the previous year. Duplicate sampling is required to ensure the results represent true natural groundwater quality.

Sewage Lagoons: Twenty-eight proposals for municipal sewage lagoon siting and construction were assessed. In addition, staff conducted several inspections regarding seepage complaints and held technical meetings with design consultants. Currently five lagoon and reservoir sites are instrumented to detect seepage.

Hydrocarbons: More than 130 gasoline-related incidents were dealt with during the year. These included on-site investigations, reports, clean-up supervisions, sampling and testing, inventory audits, court testimony and meetings with various fire departments.

Groundwater Contamination: More than 20 groundwater contamination-related events were handled during the year, including responses to domestic water well quality problems, municipal and industrial landfill siting concerns, municipal landfill reclamation studies and industrial spill-related events.

Wastewater Irrigation Site Suitability Assessments: This program is a site investigative service provided to the Standards and Approvals Division to assist the division in granting/assessing permits for sites to use irrigation as a means of wastewater disposal. Under this program, 15 sites were evaluated. Of these, eight were approved for development.

Waste Assistance Branch

This branch has responsibility for two specific programs, the Waste Management Assistance Program and the Beverage Container Recovery Program.

Waste Management Assistance Program: Since 1976, this program has provided capital funds and technical assistance to regional municipal waste management services.

There are 25 Regional Waste Management Systems operating in Alberta which use 129 solid waste transfer stations, 20 regional sanitary landfills and one private sanitary landfill for municipal solid wastes. These facilities have replaced approximately 193 old dump sites. Two regional sanitary landfills are licenced as Class II Industrial Landfills and are able to accept solid hazardous wastes that are not prohibited from landfill disposal.

One new regional system started operation in 1989/90. Four systems were at various stages in their construction and three new systems received initial grant payments. The program provided $2.78 million to seven Regional Waste Management Authorities.

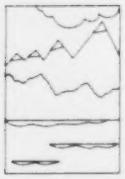
Feasibility studies were conducted for eight regions in the 1989/90 fiscal year.

Beverage Container Recovery Program: Alberta's beverage container recovery system, in operation for 18 years, provides a recycling alternative to landfilling containers.

There are 208 beverage container depots operating in the province (49 urban and 159 rural). Fifty-four depot applications were reviewed, resulting in approvals to operate issued for 39.

Changes made to the Beverage Container Act and Regulation in January 1989 required beverage manufacturers and distributors to register the products they sell with Alberta Environment. This resulted in contact with 100 manufacturers and distributors to determine the presence of 7,451 registered products; of these, 4,891 are Alberta Liquor Control Board products. Beverage container depots are continuously informed of the containers they must accept.

Deposits on beverage containers were simplified so that containers one litre or less require a deposit of five cents and those more than one litre of 20 cents.



POLLUTION CONTROL DIVISION

The Investigations and Compliance Branches make up this division. These branches fulfill the division's mission, which is "to achieve the protection, enhancement and wise use of the environment by providing firm but fair enforcement of environmental legislation in a timely and consistent manner." Investigative and emergency response functions are carried out by the Investigations Branch while the Compliance Branch reviews non-compliance issues or investigation reports, and evaluates and recommends appropriate enforcement actions.

Investigations Branch

The Investigations Branch responds to public complaints, environmental quality concerns and environmental emergencies. Investigations of pollution sources are conducted through source identification, gathering and assuring the quality and integrity of evidence, evaluating pollution incidents or environmental quality concerns, and carrying out any additional steps in support of possible enforcement action.

Industrial quality control programs continue to be administered by the division, and include source monitoring and calibration checks of industrial ambient air monitoring equipment.

During its first full year in operation, the Investigations Branch responded to 4,671 industry reports, public complaints, and environmental emergencies. Compiled onto an online data base by category (air, land, or water-related) and industry (construction, petroleum, etc), these calls generated statistics useful for future planning.

Investigation of routine complaints, recording of industry notifications of possible licence contraventions, and resolution or review of issues for possible further enforcement actions were accomplished this year. Results of investigations were forwarded to the Compliance Branch for recommendation and implementation of the appropriate enforcement action.

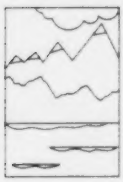
In this period, the Investigations Branch responded to a variety of environmental emergencies throughout the province; most notable were the spill of sodium dichromate on Highway 16X (Yellowhead Trail), the dimethylanilene spill on Wagner Road in Edmonton, and the increased incidence of transformer oil spills containing PCBs.

Compliance Branch

This branch responds to non-compliance with environmental legislation, licences and permits through education, remedial and punitive actions. Staff evaluate the enforceability of permits and licences issued by the Environmental Protection Service. After reviewing the investigation files, the staff prepares appropriate recommendations for enforcement action which may include Control Orders, Stop Orders, Court Orders and/or prosecutions. Staff draft all Control and Stop Orders, prepare the court briefs for prosecutions, and as part of their review, ensures the legislative authority to issue orders and verify enforceability of the conditions of the orders. Staff of this branch have participated in a review of existing legislation.

During the 1989-90 fiscal year, the Compliance Branch served 25 environmental control orders to effect compliance with environmental statutes. One Stop Order, required a company to cease all activities until it had fully complied with the terms of the order. The department, in conjunction with the Attorney General's Department, initiated charges against six companies; and it obtained one court order to have a company remove illegally stored hazardous waste.

WATER RESOURCES MANAGEMENT SERVICES



P.G. Melnychuk, P.Eng.
Assistant Deputy Minister

R.K. Deeprose
Director
Technical Services Division

J. Campbell
Acting Director
Development and Operations Division

A.R. Strome
Director
Water Resources
Administration Division

B. MacLock
Director
Planning Division

Water Resources Management Services is responsible for the overall management of water resources within the province and for water resource matters held in common with other provinces and the federal government. These responsibilities are carried out by the Services' four divisions: Technical Services, Development and Operations, Water Resources Administration and Planning.

Water Resources Management Services represents the province in interprovincial and federal/provincial water management matters and implements water agreements with the government of Canada. The Assistant Deputy Minister represented Alberta on the Prairie Provinces Water Board and on the Mackenzie River Basin Committee. The Assistant Deputy Minister also represented Alberta Environment on the Alberta Water Resources Commission and the Montana - Alberta Border Advisory Committee. During 1989-90, he also served as a member of the Oldman River Dam Review Board.

Alberta Water Resources Commission

The Alberta Water Resources Commission was involved in the development of proposed water management policies, including guidelines for irrigation expansion, for the South Saskatchewan River Basin. The Commission continued work on wetlands management policies with assistance from an interdepartmental steering committee. Research funds were used to support work dealing with on-farm water management, development of water management plans for watersheds in northern Alberta, instream flow needs determination, the Special Areas Water Supply Study, the Western Irrigation District Strategic Management Study, and the Atlas of Alberta Lakes.

Prairie Provinces Water Board (PPWB)

The PPWB consists of representatives from the federal government and the provincial governments of Alberta, Saskatchewan and Manitoba.

Established in 1948, it administers the 1969 Master Agreement on Apportionment of eastward flowing rivers and makes recommendations on water resource matters that concern more than one jurisdiction. During 1989-90, the principal activities affecting Alberta were the following:

Apportionment Administration: The Board approved the Proposed Hydrometric Monitoring Program and Meteorological Station Lists for 1990-91. The terms of the Master Agreement on Apportionment were met over the 1989 apportionment period, with the exception of a minor deficit on Middle and Lodge Creeks due to low flow conditions. Alberta Environment is studying more accurate methods for estimating minor diversions on these creeks. The study will also develop proactive approaches to prevent the recurrence of apportionment deficits.

Committee on Hydrology: The committee reviewed existing procedures for apportionment monitoring of Lodge and Middle Creeks and agreed to monthly reporting in 1990. The committee also reviewed the satus of the proposed "Prairie Evaporation Study" being undertaken by the National Hydrology Research Centre (NHRC).

Committee on Groundwater: The committee discussed the status of the water resources database WATDOC with respect to the bibliography of groundwater reports in the prairie provinces. Alberta and Saskatchewan groundwater reports are now all listed and work is continuing on listing Manitoba reports. The Committee also prepared a draft of the report "An Evaluation of Existing Groundwater Legislation, Regulations and related policies in the Prairie Provinces."

Committee on Water Quality Policy: This committee reviewed the responsibilities and activities of the PPWB in the area of water quality and examined ways to develop and apply water quality objectives.

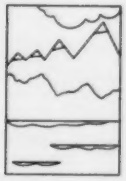
In October 1989, the Committee presented its recommendations to the Board in a report "Proposed Water Quality Strategy for the Prairie Provinces Water Board." The Committee, having completed its assignment, was dissolved in October 1989.

Committee on Water Quality: The committee agreed upon the goals and objectives of the PPWB Water Quality Monitoring Program. Eleven interjurisdictional river reaches were identified and collection of water, sediment, and biota samples will continue. The committee also developed site-specific water quality objectives for the 11 river reaches to replace the 1973 objectives. The Committee continued its work reviewing various water quality conditions on interprovincial streams to identify present or potential water quality concerns.

Mackenzie River Basin Committee (MRBC)

The Mackenzie River Basin Committee was established by the Governments of Canada, British Columbia, Alberta and Saskatchewan. The Northwest and Yukon Territories are also represented on the Committee. The MRBC is responsible for the exchange of information on water and related resource activities and developments in the basin, and for advising on implementation of recommendations from the 1981 Mackenzie River Basin Study Report.

The jurisdictions in the basin have supported the recommendation to develop bilateral transboundary water management agreements. In 1989-90, Alberta continued discussions with the Northwest Territories and British Columbia toward such agreements. These discussions were supported by significant progress in background data collection and analysis. Discussions with Saskatchewan also continued.



TECHNICAL SERVICES DIVISION

The division co-ordinates the department's operations in the physical and quantitative assessment of the occurrence, movement, control and effect of water; administers the Ground Water Development Act and services the department's engineering survey needs. The division provides information, expertise and engineering studies in hydrology, river flow forecasting, river engineering, surveying and ground water development.

Survey Branch

This branch provides land and water surveys to the department. Data collected are used for investigation, implementation and management of departmental projects, for management of the province's water resources and contributes to the data base of land survey and hydrometeorological information. The branch carries out its responsibilities through two sections, the Land Survey Section and the Water Survey Section. It also operates the Technical Services Division Records Centre which provides land survey and hydrometeorological data and related information to users on request.

Land Survey: Engineering and control surveys were performed and legal surveys, aerial photography and mapping services were obtained.

Surveying and mapping services for the Canada-Alberta Flood Damage Reduction Program were carried out for 10 communities at a contracted cost of $720,144.05. In total 510 projects were delivered.

Water Survey: Hydrometeorological data were gathered by the section's field staff through two Federal-Provincial Cost-Sharing Agreements.

Some 25 stations were operated under the terms of the Federal-Provincial Cost-Sharing Agreement for Meteorological Programs and Stations at a cost of $14,288.66. Under the terms of the Federal-Provincial Cost-Sharing Agreement for Water Quantity Surveys, 472 stations operated at a cost to Alberta of $927,000 in 1989/90.

Expansion of the real-time hydrometeorological network by the installation of six additional satellite data collection platforms and 16 landline systems in the southern part of the province brought the total in the network to 127 stations.

Hydrology Branch

Hydrological engineering analyses of the province's surface water resources are undertaken by this branch. This responsibility includes the determination of annual and seasonal volumes of streamflow, the magnitude of extreme events such as floods and droughts, and provision of hydrometeorological information and analyses for water management projects such as river basin planning, reservoir design and lake stabilization. The branch also assesses both the natural and human-altered environmental characteristics affecting streamflow.

During the year, 304 requests for service ranging from the hydrologic review of Ducks Unlimited projects to the determination of the natural flows for the Peace River were received.

Major completed projects included a variety of studies such as the hydrologic studies which supplied data for the Flood Damage Reduction Program (FDRP) for the Towns of Slave Lake, Black Diamond/Turner Valley, Bragg Creek, High River and the cities of Edmonton and Red Deer. This agreement between the province and the federal government defines and designates flood prone areas.

An assessment of the current water licencing situation in the Beaver, Bigknife, Deer, Monitor, Paintearth, Rolph and Wolf Creeks and Elbow River basins was completed. Hydrology reports and maps for approximately 260 water licences in these basins present the expected volume of water available for future use at each licence location.

Hydrogeology Branch

This branch's mandate is to identify, protect, enhance and conserve groundwater resources. Major programs include administration of the Ground Water Development Act, operation of the Groundwater Information Centre, hydrogeological and geophysical monitoring, groundwater resource inventory and liaison between the water well drilling industry and well owners. Province-wide compliance with groundwater legislation and regulations is monitored by five drilling technologists in the field. The Hydrogeology Branch also provides technical support to the department and other government agencies in hydrogeological, geological and geophysical matters.

A comprehensive computerization of the records at the Groundwater Information Centre involved entering water well driller reports into database files. New reports and selected areas of the historical backlog of water well data are being entered; over 7,000 well records are added to the database annually. All data continue to be available on microfiche.

Twelve observation wells were added to the Provincial Groundwater Observation Well Network, bringing the total number of wells to 310. Separate monitoring networks at Buffalo Lake and near the Dickson, Paddle River and Oldman River dams are monitoring the long-term impact of reservoirs on the groundwater regime.

During the year, various hydrogeological projects and investigations were conducted around the province.

A seismic monitoring program continued in the area surrounding the future reservoir to be impounded behind the Oldman River Dam. The program will establish the local level of background seismicity in order to assess future seismicity which may be induced by the filling of the reservoir.

Turtle Mountain in the Crowsnest Pass is being monitored on a continuing basis to provide early warning of a possible rock slide of comparable magnitude to the Frank Slide of 1903 and to develop and perfect up-to-date rock stability monitoring technologies. Aerial photogrammetric surveys, laser ranging measurements, hourly strain gauge measurements and continuous microseismicity monitoring are major aspects of this program. No significant rock movements have been detected, although small tremors within the mountain have been recorded.

River Engineering Branch

This branch provides services in the following general areas: river erosion protection and river training; flooding analysis and preparation of flood risk maps for land bordering on rivers and lakes; hydraulic analysis for flood reduction schemes; ice jam monitoring and control at freeze-up and breakup; evaluation of the impact of water management works (dams, weirs, etc.) on the existing regime of the rivers, evaluation of gravel mining, pipeline crossings, bridges, culverts, intake and outlet works; flood data (flood surveys), and river data (cross sections surveys, bed and bank samples), collection and preparation of river regime studies.

During the year, the branch responded to 293 requests from other divisions and departments.

Erosion Protection and River Training

Problem evaluation and preliminary design reports related to river erosion, sedimentation and stabilization were prepared for a number of projects including: Fort MacLeod Erosion Protection - Phase II Level II; Clearwater River Dike Protection and Lac Des Arcs dust problem.

Flood Risk Analyses

Staff prepare flood risk maps showing floodprone areas; land developers use them to prevent future loss of human life and property. Major projects included: the Paddle River Dam - 1:100 flood study for downstream flooding and the Pembina River Floodplain Management Study.

Flood Damage Reduction Program

Canada and Alberta signed "An Agreement Respecting Flood Damage Reduction and Flood Risk Mapping" in April 1989. Under this program, flood risk maps will be prepared for about 50 urban communities in Alberta with the River Engineering Branch providing major technical input for their preparation. In-house work was started on revising flood risk maps for Cochrane, Okotoks, Medicine Hat, St. Albert, and Calgary. Technical support was provided in initiating the survey, mapping, and hydrology components of the FDRP for a number of other communities.

Flood Control Studies

The following flood control studies were conducted: Sawridge Creek, flooding control alternatives; Lac La Biche, stabilization; Prairie Rivers/Buffalo Bay, investigations; South Heart River, backwater flooding; and Freeman River, flood mitigation.

Ice Jam Monitoring and Control

Both breakup and freeze-up ice fronts were monitored at Peace River and Fort McMurray. Extensive work was done with the Alberta/B.C. Hydro Joint Task Force for the Peace River to establish the freeze-up level of the Peace River at Peace River. A portable ice monitoring station was set up on the Athabasca River upstream of the City of Fort McMurray to provide the city administration an early warning of any impending ice run from upstream.

Fish Mitigation Works

Designs were prepared for fish mitigation structures for the Oldman River Dam Fisheries Project.

River Forecast Centre

The River Forecast Centre monitors river streamflow conditions and provides flood forecasts for disaster prevention and flood damage reduction. It also produces water supply forecasts to assist with the management of the province's water resources.

Streamflow Monitoring and Forecasting

The Centre continuously monitored weather, snowpack, and streamflow conditions throughout the province. Impending flood situations resulting from rainfall or melting snow were detected and analyzed. Whenever necessary, the Centre disseminated warnings of expected high river levels to a variety of agencies responsible for flood damage prevention and flood event analysis.

The major river to flood in the summer of 1989 was the Paddle River in early August. However, the Paddle River Dam prevented flooding from being much more severe.

The Centre monitored streamflow conditions at Alberta's borders and advised the department's water managers regarding impending difficulties to ensure that the province satisfied its responsibilities in interprovincial and international agreements.

The Centre's responsibility for acquiring data related to water management operations and providing real-time information to water managers continued to grow with Alberta Environment's increasing water management activity.

Weekly river reports on current streamflow conditions and expected trends for many of the streams in Alberta were produced and disseminated. The Centre continued its public information service for canoeists and other recreational users through a toll-free automatic telephone facility.

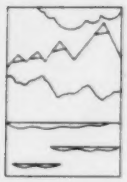
Water Supply Forecasting

The Centre produced and distributed the "Water Supply Outlook for Southern and Central Alberta" report in co-operation with the Survey Branch on a monthly basis from March to August.

Water supply conditions in southern and central Alberta during the summer of 1989 were generally below normal.

Climatic Network and Data Acquisition

The Centre used data from Alberta Environment's real-time hydrometeorological network extensively and continued its planning for the gradual expansion of this network into areas where the present database is insufficient for river monitoring and forecasting services.



DEVELOPMENT AND OPERATIONS DIVISION

Services ranging from investigation and design through to operation and maintenance of water management projects are provided by this division. Engineering services are provided through the Design, Geotechnical and Construction branches. Operations and maintenance of water management projects are carried out by the Projects Management and Water Management Headworks Branches. Administrative support, supply and maintenance of equipment and operation of the revolving fund are the responsibility of the Equipment Supplies and Services Branch. Management of the Irrigation Headworks Rehabilitation Program is provided through the Director's office.

The Director's Office manages and administers the Irrigation Headworks Improvement Program, which is funded under the Alberta Heritage Savings Trust Fund, through a Program Co-ordinator. This 15-year program, initiated in 1980, provides funding for rehabilitation and improvements to provincially owned headworks and main canal systems of the irrigation districts, development of internal storage reservoirs within irrigation districts and the implementation of Sheerness Water Supply and Deadfish Diversion projects in the Special Areas. Work has been initiated on all components of the program. The construction of all the internal storage reservoirs, the Lethbridge Northern Irrigation District Headworks rehabilitation and the Special Areas projects have been completed.

Design Branch

The Design Branch performs feasibility, preliminary and detailed hydraulic and structural engineering design and drafting for the development, rehabilitation, and maintenance of various water management projects. These designs are prepared for the rehabilitation of existing irrigation headworks systems and for development of water management projects such as lake stabilization, flood control, erosion control, and drainage projects. The branch co-ordinates design for projects which are mainly hydraulic and structural in nature and provides project management services on larger, more complex projects.

The branch carries out technical reviews of engineering designs performed by others and engineering design for water management projects requested by other departments.

Diversified drafting services, including photographic services, were provided to the division and the department. The drafting units continued to provide support for the preparation of preliminary and contract drawings for multi-purpose water management projects, flood inundation maps, mosaics, various plates for reports, art graphics and displays for meetings and conferences. A major contribution was made to the preparation of the "Atlas of Alberta Lakes".

The branch prepared 19 preliminary and 14 detailed project designs and reviewed 11 projects for the Controller of Water Resources.

One of the projects designed by the branch was the United Irrigation District Rehabilitation program which involves a phased upgrading of 15 kilometres of the existing main canal system and associated structures; in the 1989/90 construction period, rehabilitation of the first 5.7 km of canal was undertaken at a cost of $2.4 million and a predesign report for the next 4.1 km of canal was prepared.

Another was the Hutch Lake Dam, a multi use project, located approximately 30 kilometres northwest of High Level, involving construction of a dam, associated structures, and reservoir clearing. The spillway structure and a day use recreation area were constructed in 1989/90 at a cost of $1.4 million. This completed the project for a total construction cost of $3.5 million.

The Special Areas Water Supply Project, a conceptual level (Phase I) engineering study jointly undertaken with the Prairie Farm Rehabilitation Administration in November 1988, was nearing completion in March 1990. The study shows that the Nevis route canal alternative ($86 million) has the lowest overall capital and operating costs of the three alternatives.

Geotechnical Branch

This branch provides geotechnical investigations, soil laboratory and construction quality control testing, preliminary and final geotechnical engineering designs, seepage control evaluations, concrete material evaluations, project management and land administrative services for departmental water management projects.

Geotechnical Design Section: The section is responsible for all of the geotechnical design requirements for departmental water management projects. This work includes conceptual designs, geotechnical investigations, evaluation of soil parameters, detailed geotechnical design considerations, cost estimates and preparation of final contract documents.

During the past year, the section completed eight preliminary and 18 final geotechnical designs for a variety of projects such as the rehabilitation of existing irrigation headworks systems, flood protection and recreation dams, lake stabilization structures, flood protection diking, erosion control structures, and slope stabilization.

The section also provided 51 specialized geotechnical engineering reviews for the department including dam safety evaluations for dams owned by the department, river bank stability evaluations, subdivision development proposals, etc.

Geotechnical Investigations Section: The section performs detailed geotechnical investigations, specialized in situ testing, monitors instrumentation installations and granular and rock riprap material resource reconnaissance for departmental water management projects. These duties include provision of drilling equipment and labour required to drill boreholes, field classify and sample soils and, where required, specialized in situ permeability and strength testing as well as monitoring equipment installation.

During the past year, a total of 32 branch projects and 15 other sites were investigated.

Laboratory Services Section: The section provides soil laboratory and construction quality control testing for departmental water management projects including detailed classification and physical strength laboratory testing of soils as well as evaluation of the suitability, degree of compaction and gradation characteristics of soils used in the project construction. The section also performs concrete quality control testing as well as concrete material evaluations.

During the past year, the section conducted laboratory testing for 20 projects and construction quality control for seven projects.

Land Services Section: The section administers the inventory of lands owned and controlled by the department. Land use agreements for engineering studies and easements, leases, and permits to agencies requesting access or use are negotiated and granted through Land Services. The section also co-ordinates departmental land-related referrals, transfers land titles to the department and posts reservations on Crown land on behalf of the department.

It also provides land-related services to other divisions within the department including appraisals, damage claims, purchase agreements, etc.

Construction Branch

The branch manages construction, and administers contracts for the construction of water management projects. In 1989/90, the branch worked on 46 projects involving expenditures of approximately $10.2 million.

The branch also performs public tendering procedures for acquisition of construction services and agreement execution processes for consulting, construction and utility service agreements for the Design, Geotechnical and Construction Branches. In 1989/90, 68 contracts were processed.

Branch staff were project managers for the Eastern Irrigation District and Western Irrigation District Main Canal projects and for Parlby Creek-Spotted Lake, Whitford-Rush Lakes, and Waskatenau Creek and town of Slave Lake Flood Control projects.

Two examples of construction projects in 1989/90 are as follows:

Northwest Rehabilitation Projects - these projects are located throughout the Peace River area and involve upgrading of existing flood control and drainage channels. Work was carried out on 15 projects such as constructing grade control structures at an expenditure of $625,000.

Fort Macleod Erosion - this project in Fort Macleod, involved the construction of erosion control measures to prevent further bank erosion of the Oldman River at the historic fort site. A two year project, the first phase in 1989-90 involved an expenditure of $160,000.

Projects Management Branch

This branch operates and maintains provincially owned and cost-shared multi-purpose water management projects. Some 60 water control structures provide flood control, water conservation, stream flow regulation, lake stabilization, recreation, wildlife and waterfowl habitat and assured water supplies for many towns and villages. Another 180 water management projects provide flood, erosion and drainage control. This year, the branch accepted responsibility for several new projects including the Hutch Lake Dam, Phase II of Parlby Creek and four flood, erosion and drainage control projects.

The central sector operated various water control structures including Thunder Lake, Gull Lake, Pigeon Lake, Bigelow reservoir and Morecambe structure. Heavy rainfall during the first week of August, 1989 eroded banks and flood control dykes along the Paddle and Pembina river systems. Repairs were carried out under the Flood Damage Recovery Program to restore the dykes to preflood conditions.

Projects in the southern sector include domestic, municipal, irrigation, stock watering, recreation, fisheries and other uses. General inspections and maintenance were carried out on 27 projects. Water diverted or released to assist users with water requirements totalled 84 million cubic metres.

The 1989/90 season was the seventh year of operation and maintenance of the Dickson Dam. The reservoir was

operated to optimize the water level for flood control while still providing opportunities for recreational use.

Two lake stabilization projects operated by the branch are Gull Lake, located 12.9 kilometres west of Lacombe and Lac Ste. Cyr, 19.3 kilometres southeast of St. Paul. Both lakes are used extensively for recreation.

The Deadfish/Sheerness Water Supply System located south of Hanna and north of the Red Deer River in Special Area No. 2 is a pumped diversion scheme on the Red Deer River, consisting of pipelines, concrete canals and natural stream beds for conveyance of water to irrigation, domestic and municipal users. During 1989, the systems provided water for 2,985 hectares of irrigation in addition to supplying water for the Henry Kroeger Regional Water Services Commission, Cessford, Sunnynook and many stock water dams and dugouts.

Under the Site Development Program, designated areas at reservoirs and stabilized lakes used as access points for water based recreation are developed to accommodate day-use activities. During 1989/90, upgrading and development was carried out at Coal Lake, Little Bow reservoir, St. Mary's reservoir and Gleniffer Lake/Dickson Dam. Under this program, 33 day use sites have been established for the general public's use on 21 stabilized lakes and reservoirs throughout Alberta.

Equipment, Supplies and Service Branch

This branch provides support to Water Resources Management Services and the department, and has several functions:

Administrative Support Section: The section is responsible for the overall budget, financial management, personnel administration and records management for the division. It also provides contract administration for use of works, site maintenance and revenue agreements.

Revolving Fund Accounts Section: The accounts section monitors and processes payments to vendors, invoices users for items sold or rented, monitors revenue and expenses, reports to management on financial status and prepares and monitors the Revolving Fund budget.

Materials Section: The section maintains a supply of materials, hardware, small tools, and equipment for use in construction, maintenance, drilling and survey activities on water management projects undertaken by the department. With warehouse and yard storage facilities in Edmonton, Lethbridge, Grande Prairie and Peace River, the section manages a bulk material stock inventory of approximately $.25 million and provides support through the provision of purchasing, warehousing, transport, distribution and equipment leasing services.

Equipment Section: A variety of both large and small equipment consisting of approximately 600 units is administered by the Equipment Section to provide support to the Water Resources Management Services. Repair, welding, and carpentry services are provided in Edmonton and Lethbridge.

The section made repairs to driving banks on the Western Irrigation District main canal; assisted Alberta Agriculture with the Farm Water Program; constructed parking lots, roadways, and walking paths for the Site Development Program.

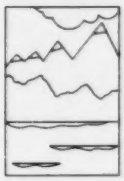
Central Vehicle Services: The vehicle co-ordinator for Alberta Environment administers the vehicle pool for the department throughout the province. Approximately 350 vehicles were issued this year on permanent, seasonal and short-term bases.

Water Management Headworks Branch

The branch manages, operates and maintains water management headworks systems which supply water for multipurpose use, including water for 11 of the 13 irrigation districts in southern Alberta. These five provincially owned systems include five river diversion weirs, 191 miles of main canal, ten dams and storage reservoirs and hundreds of structures including flumes, syphons, spillways, drops, checks, turnouts and bridges. The water systems service about one million irrigated aces and supply water for 48 towns and villages, 50 developed recreational facilities, industrial users, and wildlife and waterfowl habitat. The branch carried out a general maintenance program in the following systems: the Waterton-St. Mary headworks system; the Lethbridge Northern headworks system; the Caresland-Bow river headworks system; the Western headworks system.

General activities applicable to all systems included: debris and tree removal from canals and trashracks, road maintenance, surface and subsurface drainage improvements, bank erosion repair, painting, fence repairs, weed control and extensive park maintenance activities.

A total of 1.3 million acre-feet of water were delivered by the headworks systems in 1989 (Table 12).



WATER RESOURCES ADMINISTRATION DIVISION

This division is made up of the office of the Director, four branches and five regional offices. The division administers and enforces under the authority of the Water Resources Act, the Water Resources Regulations, Provincial Water Power Regulations, the Dam and Canal Safety Regulation and the Drainage Districts Act and such programs as the Alberta Water Management and Erosion Control Program which provides financial assistance to local authorities. Services are extended to the general public, local authorities, industry, other government departments as well as divisions within Alberta Environment.

Administrative Support Branch

This branch is responsible for the overall budget, financial management, personnel administration, purchasing, accounts payable, inventory control, records management control and consultant contract administration for the division.

It provides administrative and advisory support to the nine drainage districts in Alberta and co-ordinates requests for flood analyses and the appraisal of damage claims for Alberta Public Safety Services.

Financial Administration Section

This section prepares the yearly divisional budget, monthly budget forecasts, and is responsible for purchasing, accounts payable, payroll, contract administration, inventory control of fixed assets including EDP hardware and software, attractive items and controlled numbered forms. It also co-ordinates accommodation, parking, vehicle rental and office automation for the division.

Records Administration Section

The creation, maintenance, retrieval, control and disposition of records on management and licensing of the province's water resources are the responsibility of this section. These records are used mainly by the Water Rights Branch and Regional Services Branch in the administration of the Water Resources Act and Ground Water Development Act. Drainage district records which are used by Drainage Council in the Administration of the Drainage Districts Act are also maintained in this section. Records are stored in three main media: paper, microfilm and computer. Table 13 illustrates the work performed and a comparision of increase/decrease over the previous two years.

Alberta Public Safety Services

The branch head, as a member of the Disaster Assistance Committee, was involved with Alberta Public Safety Services in co-ordinating the evaluation of 18 storms and flood events. In addition, 290 appraisals of flood-related incidents were investigated at the request of Alberta Public Safety Services.

Water Rights

The Surface Water Rights Branch and the Groundwater Rights Branch are responsible for processing applications under the Water Resources Act for licences to divert and use surface water and groundwater.

Terms and conditions are prepared through liaison with other agencies and participation from private individuals or groups. Files and plans are maintained for all projects and the quantity of water consumed is monitored by field inspections and mailed in water-use returns.

Surface Water Rights Branch

The progress report (Tables 14 and 15) shows that the total number of new applications was down slightly from last year while the number of active projects grew.

The moratorium on the issuance of further licences for irrigation projects which was implemented on July 1, 1988 for the Oldman River Basin plus moratoria previously implemented for the Willow Creek, Highwood River, Little Bow River and Milk River Basins were retained throughout 1989-90. Exempted from the moratoria are projects for domestic, small stock watering and necessary municipal purposes.

Due to licensing concerns, a study was done for the Antelope Lake Sub-basin. The results show that the basin is fully allocated and that restrictions on the development of projects for domestic, small stock watering and necessary municipal purposes should be implemented.

Through the technical advisory committees, staff continued to support water management studies for the Pekisko-Stimson Creeks, Kneehills Creek, Highwood River and the North Saskatchewan River basins.

Water use information was collected again for Lodge, Battle & Middle Creek Basins and provided to Water Survey of Canada (WSC) Regina relative to the interprovincial and international commitments for these basins. Minor diversion from the basins in Alberta were estimated as 515 acre-feet for 1989. Water use information was also collected for the Many Island Lake Basin and provided to the Prairie Provinces Water Board (PPWB). Water withdrawals for irrigation and storage projects were estimated as 857 acre-feet for 1989. This basin is managed jointly by Alberta and Saskatchewan and the PPWB was able to update their records for all projects in the Many Island Lake Basin.

Considerable staff time was spent in various stages of the approvals required for the Oldman River Dam and the Ducks Unlimited Frank Lake project.

Hydro-Electric Section: The administration of the Provincial Water Power Regulations under the Water Resources Act is the responsibility of this section.

Field inspections were conducted to monitor progress at hydro-power maintenance projects, to ensure compliance with licences and regulations, and to observe various sites in relation to disposition applications. Modifications to improve the probable maximum flood (PMF) capabilities at the Ghost Development are continuing.

The public continues to show interest in the development of small hydro-electric facilities at various sites within the province. Submissions were received for the development of small power sites at the Belly River Chute, Waterton, St. Mary Dams and Dickson Dam.

Net hydro-electric generation in the province for the past year was 1,616,310 megawatt-hours (Table 16).

Groundwater Rights Branch

The Groundwater Rights Branch continued to experience a sharp increase in the number of applications for licences received throughout the 1989/90 fiscal year (Tables 17 and 18). This increase resulted from the large number of water wells drilled under the Alberta Water Supplies Assistance Program which ended on March 31, 1990. Most of the applications were for approval to divert and use ground water for licensable agricultural purposes.

A total of 230 field inspections were carried out during the 1989/90 year, an increase of approximately 24% over the previous year attributed to concerted efforts to visit many of the sites where new wells were completed under the Alberta Water Supplies Assistance Program. Staff carried out a total of 230 inspections.

Dam Safety Branch

The Dam Safety Branch reviews designs for dams referred by the Controller of Water Resources and monitors the safety of existing dams. The branch operates under the authority of the Dam and Canal Safety Regulation which applies to dams that are at least eight metres high or have a reservoir capacity of at least 62,000 cubic metres. In 1989-90, 1,337 dams met these criteria and were included in the branch inventory.

During 1989-90, the Dam Safety Branch reviewed designs submitted for about 50 water rights licence applications. Reports on Dickson Dam, Poplar Creek Dam (north of Fort McMurray), Genesee cooling pond and Suncor and Syncrude tailing ponds were reviewed and safety reviews were prepared for the North and South McGregor, Waterton, St. Mary, Jensen, North and East Ridge dams.

A major part of the branch's work is inspections and instrumentation. In 1989-90, 117 dams were inspected at locations ranging from the Cypress Hills to Fort McMurray. Instrumentation was read at several projects including Dickson and Paddle River Dams and the major Irrigation Headworks dams. Slope indicators were read adjacent to the Carseland Weir, the Western Irrigation District Weir and Taylor's Coulee Chute. Instrumentation proposals for the Oldman River Dam were reviewed.

Staff carried out detailed computer analyses of the effect of hypothetical breaches of the Oldman River Dam. The branch hosted the inaugural conference of the Canadian Dam Safety Association and also made presentations to the British Columbia Water Resources Department, CANCOLD (the Canadian National Committee on Large Dams), the Water Survey of Canada and the Canadian Water Resources Association.

Regional Services Branch

The Regional Services Branch administers and enforces the Water Resources Act, administers the program that provides financial assistance to local governments and municipalities, technical assistance for farm water management projects and inspects water-related problems.

The five regional offices are located in Peace River, Edmonton, Red Deer, Calgary and Lethbridge. These offices are responsible for authorizing non-consumptive uses of water as required by the Water Resources Act and for undertaking Water Rights Branch inspections to assist in licensing consumptive water use. In addition, letters of authority authorizing temporary withdrawals of water are issued. Regional offices are also responsible for investigating violations of the Water Resources Act and for commencing court actions where appropriate.

Financial assistance is provided to local governments under the Alberta Water Management and Erosion Control Program. The Alberta Government contributes 75 percent of engineering and construction costs, except where water management projects improve agricultural land or production, in which case it provides 86 percent of these costs. Projects eligible for assistance include flood and erosion control, water management, flow regulation, water-based recreation, wildlife enhancement, sources of water supply, water conservation projects and water management overview studies.

In 1989-90, Alberta Environment provided $4,110,000 in grants to local governments under the Alberta Water Management and Erosion Control Program.

Under the Farm Water Management Program, the regional offices provides technical assistance (survey and design) to landowners who wish to construct water management projects.

(Table 19 summarizes regional activities for the year)

The Regional Services Branch also administered the Alberta Water Supplies Assistance Program. 1989-90 was the final year of this two-year program, with applications considered up to March 31, 1990.

As a response to prolonged dry conditions this program provided financial assistance to individual landholders for drilling water wells, and to communities for developing temporary replacement water supplies.

During the 1989-90 year, 5,422 individual landholders received well drilling grants, and 10 communities were assisted with the provision of temporary replacement water supplies.

(Information showing grants paid for individual and community projects, in each region, is found in Table 20)

Peace River Region: A normal spring runoff occurred in 1989 throughout the Peace River region. In the Fort Vermilion area, a gradual thaw with no major flooding was experienced. Heavy rains in the fall resulted in some flooding and severely hampered the harvest in the Spirit River and Grande Prairie areas.

A total of 264 inspection requests were received. There were 226 inspections conducted and 206 technical reports processed.

The region issued 32 interim licenses for non-consumptive projects, 168 permits and 82 letters of authority for temporary water use.

Under the Alberta Water Management and Erosion Control Program, 16 projects were constructed or started . Alberta Environment's share of the works completed in the fiscal year was $823,150.

During the year, 40 designs were completed under the Farm Water Management Program.

The region processed 266 applications for grants under the Alberta Water Supplies Assistance Program. Grant payments totalled $461,960.

Edmonton Region: This area received near normal precipitation for the period November 1, 1989 to March 31, 1990. There were 387 requests for field inspections on water control and water management problems, 134 of which were related to alleged violations of the Water Resources Act. During this fiscal year, 396 field inspections were completed with 76 requests outstanding. In addition, 118 inspections were completed on projects for which a licence or permit was issued.

A total of 70 licence applications and 305 permit applications were received. A total of 64 interim licences, 35 licences, 114 letters of authority and 297 permits were issued. As of March 31, 1990, there were 61 outstanding permit and licence applications requiring processing.

During the 1989/90 fiscal year, a total of 36 projects were funded with local authorities under the Alberta Water Management and Erosion Control Program. Grants paid totalled $1,520,150.

There were 22 new requests under the Farm Water Management Program with 24 surveys and 11 designs completed during the fiscal year, and construction undertaken on five projects. A total of seven interim licences and eight licences were granted for projects under this program.

The Edmonton region prepared two court briefs related to a violation under the Water Resources Act. Two cases involved prosecution under the Act, and six cases were referred to the Water Resources Act Enforcement Committee.

The region processed 2,531 applications for grants under the Alberta Water Supplies Assistance Program, with payments totalling $3,404,280.

Red Deer Region: Water supply conditions throughout the Red Deer region varied from near average in the western or foothills region to extremely dry in the eastern or prairie regions. Although snowfall was near to average, runoff was still below average in most areas. The eastern areas received little or no runoff.

The region received 200 inspection requests (25 outstanding from the previous year); 201 inspections were carried out, leaving 24 inspections outstanding.

The region received 111 permit applications, eight licensing applications and 188 requests for temporary authorization for water withdrawal.

Regional staff issued 106 permits, three interim licences and 118 letters of authority. The region also issued four final licences under the Water Resources Act.

A total of 16 new requests were inspected under the Farm Water Management Program.

Sixty-one outstanding projects were carried over from previous years. Additional staff in this area allowed the program backlog to be reduced from 61 to 14.

Under the Alberta Water Management and Erosion Control Program, 10 projects were funded with grants paid totaling $496,720. Over 47 potential projects were investigated and inspected for eligibility under the program.

The Red Deer region prepared one court brief for an enforcement case regarding a violation under the Water Resources Act. Four cases were referred to the Water Resources Act Enforcement Committee for review and recommendations.

Under the Alberta Water Supplies Assistance Program, the region approved 1,171 grant applications and awarded grants totalling $1,487,320.

Calgary Region: The region experienced above average snowfall in the mountains in the winter and spring, resulting in above normal runoff values in the western portion of the region; there was generally no runoff in the Special Areas. Some minor localized flooding was experienced at the Towns of High River and Okotoks and in the City of Calgary.

A total of 116 inspection requests were received, with 165 inspections completed, and 65 inspections outstanding.

The region issued 111 permits, 11 licences and 82 temporary authorizations for water withdrawals under the Water Resources Act.

Under the Alberta Water Management and Erosion Control Program, four projects were constructed and 10 were under review. The total amount of grants paid was $470,450.

The region prepared one court brief for an enforcement case relating to a violation under the Water Resources Act.

The region, under the Alberta Water Supplies Assistance Program, approved 950 grant applications. The grant payments totalled $1,243,300.

Lethbridge Region: In 1989, precipitation returned to near normal levels and with early start-up of river diversions, storage reservoirs recovered to normal operational levels. By early summer, the accumulated moisture deficit was evident in the continued poor performance of many aquifers and stream discharges far below expectations considering the precipitation received. Soil drifting was a problem again as a result of previous poor crops and low stubble cover.

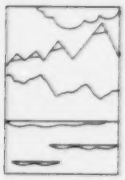
The region received 154 inspection requests with 183 inspections undertaken. There was a carry over of 57 inspections.

During this fiscal year the region received 50 applications for permits and six for non-consumptive use licences. A total of 44 permits, 13 licences and 34 letters of authority were issued.

Under the Alberta Water Management and Erosion Control Program, grants totalling $799,480 were provided for seven projects, three of which will continue into the next fiscal year. Ten project proposals are under investigation or at various stages of approval. There were 10 requests received under the Farm Water Management Program and 12 reports were prepared.

Four enforcement issues were brought forward to the Water Resources Act Enforcement Committee for review and four court briefs were prepared.

The region processed 504 applications for grants under the Alberta Water Supplies Assistance Program, with payments totalling $1,229,040.



PLANNING DIVISION

River Basin Planning: River basin planning deals with the water resources of a basin as a system. Basin studies include water supplies and demands, environmental needs, water resource conflicts and other water related factors. A basin plan recommends ways of meeting future needs, resolves allocation and environmental problems, and provides guidance for the development of water resource projects. Plans are updated periodically to incorporate changing conditions.

A planning and management strategy for developing instream flow needs was established. The strategy involves an interdepartmental Task Force, River Basin Working Groups and the Alberta Water Resources Commission. Special interest groups, stakeholders and the general public are encouraged to participate at the river basin working group level.

Peace River Basin: Identification and assessment of instream flow needs for the Peace River was undertaken as one of a series of technical studies jointly undertaken between Alberta and British Columbia. These studies will establish a common database for future bilateral negotiations on the development of a water management agreement for the river.

Athabasca River Basin: Work in the Athabasca Basin progressed in two main areas, recreation and wetlands/ drainage. A study was initiated to rank, prioritize and categorize key recreational water bodies (lakes, lake complexes and river reaches) within the Athabasca River Basin according to their significance from a recreational and water resource management perspective.

The wetland habitat inventory used existing data to map and classify all wetland habitat for waterfowl and aquatic wildlife in the Athabasca basin.

Future work on the main stem of the Athabasca River will be co-ordinated through the Peace-Athabasca-Slave River Basin Study.

Peace-Athabasca-Slave River Basin Study: A joint federal/provincial initiative in the Peace-Athabasca-Slave River basin was initiated in October 1989. Representatives from Alberta, British Columbia, the Northwest Territories and Canadian government departments attended. The primary objective of the program was agreed to be development of a common database and agreement on interpretive methods and tools. The joint initiative would ensure that agencies were using their resources most effectively and not duplicating efforts.

Phase I—Initial Inventory and Data Gap Evaluation defined the following objectives: preparing a collective overview; identifying continuing programs, initiatives and gaps in data; developing a proposed format for a joint federal/provincial agreement; and developing options for a communications strategy. Phase I is to be completed early in the fiscal year 1990-1991.

North Saskatchewan River Basin: A set of models for simulating water quality of the North Saskatchewan River was calibrated. A program was developed for further monitoring of City of Edmonton sewer outfalls and river water quality during runoff events and for determining river time of travel under ice-covered conditions.

Cold Lake-Beaver River Basin: Implementation of the Cold Lake-Beaver River Long Term Water Management Plan continued. Planning for the implementation of the North Saskatchewan River water supply pipeline to the Cold Lake area continued under the direction of a Ministerial Task Force. Joint Alberta Environment/Energy Resources Conservation Board Water Recycling guidelines for In-Situ Oil Sands plants were issued in May 1989. These guidelines are a major water conservation initiative for Alberta Environment.

Lac La Biche Lake Level Stabilization, Feasibility Study: The study to assess the feasibility of stabilizing the level of Lac La Biche is nearing completion.

A number of stabilization alternatives and their benefits, costs and environmental impacts, as well as potential environmental impacts of the Sir Winston Churchill Park causeway are being assessed.

South Saskatchewan River Basin: The Alberta Water Resources Commission made recommendations on water management in the South Saskatchewan River Basin based on information from planning studies and input obtained from public hearings. Water management policy and strategies to guide future planning activities in the basin are being developed by Alberta Environment based on these recommendations.

Canadian Heritage Rivers System (CHRS): The Alberta Water Resources Commission requested that Alberta Environment and Alberta Recreation and Parks prepare an implementation strategy proposal for possible Alberta participation in the CHRS program. The strategy will address issues related to Alberta's membership in the program and outline the structure and processes required to carry it out in the province.

Regional Water Resource Planning

Similar in scope to river basin planning, but smaller in scale, these projects deal with small geographic areas, usually sub-basins.

Sub-Basin Water Management: The Sub-Basin Water Management Planning Study was initiated in April 1985 to improve the water management planning process in northwestern Alberta.

Pilot plans develop water management planning methodology applicable to all sub-basins in northwestern Alberta. Pilot plans were initiated for the Little Burnt and Spirit Rivers with input from local authorities, landowners and the general public. A proposal for funding such management is being prepared.

Willow Creek Basin: The Pine Coulee project will consist of a 41,000 acre foot storage reservoir located on Pine Coulee adjacent to Willow Creek, a diversion structure on Willow Creek and a 3.5 km canal from the diversion structure to the reservoir.

The purpose of the Pine Coulee Reservoir is to store water during high runoff periods for controlled release to meet downstream water needs during periods of low natural flow.

Buffalo Bay-Horse Lakes Management Plan: A long term Water Management Planning Program for the Buffalo Bay-Horse Lakes and East-West Prairie Rivers areas was announced March 21, 1990. A Public Advisory Committee was established to assist Alberta Environment in the development of a water and related land management plan that would control erosion, sedimentation and flooding and enhance agriculture, fisheries and wildlife production in the study area.

Little Bow River Basin: Water management measures in the Little Bow River basin consisted of: a diversion structure and canal from Mosquito Creek to Clear Lake; a dam and 50,000 acre foot storage reservoir on the Little Bow River downstream of Mosquito Creek; an enlargement of the Little Bow diversion canal.

These measures are intended for multi-purpose use, including recreation, stock watering, municipal water supply and irrigation in the Little Bow River basin, and improved water quality and fishery habitat in the Highwood River downstream of the Town of High River.

Highwood River Instream Flow Needs: Work began on establishing the instream flow needs for the Highwood River. A series of public meetings were held with stakeholders including fisheries groups, municipalities, landowners on the river and irrigators in the Little Bow River Basin. Work also began on the development of a plan to divert water from the Highwood River for the Little Bow Project.

Pekisko and Stimson Creeks Basins: The reports on water management for these two tributaries of the Highwood River were released to the public in October.

Pembina River Basin: Phase I of the Pembina River Basin Floodplain Study was initiated. A preliminary evaluation of the benefits and costs of various structural and non-structural alternatives aimed at reducing future flood damages in the Pembina River Valley was undertaken. The purpose of Phase I is to select the most viable alternatives for detailed evaluation in Phase II. Consultation with the general public will be undertaken prior to beginning Phase II.

Ross Creek Basin: A draft report of water management issues was completed. The future water management implications of the report are under review by senior management.

Recently an Elkwater Lake Advisory Committee has been established to review the existing water-use conflicts associated with Elkwater Lake.

Kneehills Creek Basin: The second phase of a water management program assessed the ability of present water supply to meet present and future demands, and developed water management alternatives to solve problems. The impact of alternatives was identified and an overall water management plan and strategy for the basin was completed. A final report has been prepared and distributed to technical committee members.

Etzikom Coulee: Investigation of water quality and supply problems along Etzikom Coulee continued. Water management alternatives to resolve problems experienced by users were identified and assessed. A local public advisory committee is contributing to the planning program. Ducks Unlimited and a technical advisory committee are developing a proposal to resolve most of the existing problems with Crow Indian Lake.

Swan Lake: An assessment of the potential for stabilizing the lake by constructing an outlet control structure was undertaken.

Leddy Lake: A study on the possibility of raising the water level of the lake to enhance recreational opportunities was initiated.

Nina Lake: An assessment of solutions to agricultural flooding was initiated.

Guy Area: An evaluation of regional agricultural flooding, erosion and drainage problems was initiated with the objective of identifying possible improvements to the existing surface water collection system.

Anderson Creek: This area contains productive wetland habitat but producers in the area are experiencing flooding problems. A study was initiated to develop solutions that would ensure the integrity of the wetlands and also address the agricultural concerns.

Keg River Drainage: A conceptual drainage system was developed and costed for about two and one-half townships of poorly drained land.

Kimiwan Lake Management Study: Activities have centred on negotiating with landowners on appropriate land use and target water levels.

South Heart-Winagami Operational Plan: Water Quality continues to be monitored to help evaluate operations.

Special Areas Water Supply Project Investigations are underway to evaluate the feasibility of a diversion from the Red Deer River to the headwaters of Berry and Sounding Creeks. The project, if implemented, would help to drought-proof a large portion of the Special Areas and enhance the viability of the local family-oriented beef ranching economy. The project will consist of a pump diversion on the Red Deer River near Nevis, a short pressure pipeline and approximately 100 km of open canal terminating in the upper reaches of Berry and Sounding Creeks east of Sullivan Lake. Phase I, a conceptual investigation, concluded that the project warranted investigation at the feasbility level (Phase II) which is now underway.

Milk River Project: Environmental studies addressing the impact of increased irrigation on groundwater and on the Milk River continued. Investigations of the impact of a storage reservoir on downstream vegetation were initiated. A revised estimate of water demand was prepared. The exchange of technical information between Alberta and Montana continued.

Drumheller Flood Control: Implementation of flood control measures in downtown Drumheller continued. Various alternatives for flood control in East Coulee have been assessed and a dike has been recommended by both local residents and technical investigators.

Red Deer River Valley Irrigation: A study has been undertaken to identify and evaluate the potential for expanding irrigation on land within the valley between Drumheller and the Saskatchewan border. A report has been prepared and distributed for review.

Rocky Mountain House Winter Floodplain Monitoring Committee: This committee was disbanded because the hydro-electric release restrictions observed by Trans Alta Utilities at the Bighorn Dam have effectively avoided ice pack flooding of the North Saskatchewan River in the Rocky Mountain House area. Normal monitoring procedures continue to track the formation of ice cover on the river.

Fort McMurray Floodplain Management: The proposed flood protection dyke for the City of Fort McMurray is awaiting negotiation of a cost-sharing agreement with the federal government and the city of Fort McMurray.

Environmental Impact Assessment and Mitigation Planning

The intent of this planning is to evaluate the ecological and socio-economic impacts of proposed water resource development projects, identify environmental enhancement opportunities stemming from project construction and ensure that if a project is implemented, adverse impacts are mitigated.

Parlby Creek-Buffalo Lake Development Project: The Environmental Impact Assessment (EIA) for the Buffalo Lake stabilization component of the above project was initiated in the fall of 1989. A draft EIA was presented at an open house in the Town of Erskine March 10, 1990.

Oldman River Dam Project: Work continued on the refinement of the Oldman Dam Operational Plan.

Hutch Lake Project: The pike spawning mitigation plan was refined and a feasibility analysis of a sub-impoundment continued.

United Irrigation District Headworks/Cochrane Lake: Environmental mitigation studies continued. Environmental planning from other departments was co-ordinated.

Planning Division provides a number of other services such as monitoring of water management or related environmental issues, administration of special water management programs, technical support to other government agencies or to community groups and advice and representation on interprovincial water resource matters.

Data Base and Methodology Development

The effectiveness of the Planning Division is enhanced by the compilation and updating of water resource data such as water supply and demand. As well, new analytical and predictive methods improve the capability in water quality planning.

Water Use Information System: This database provides water withdrawal and consumption statistics for agriculture, municipal, industrial, enhanced oil recovery and water power use sectors. Entry of historical data continued and information from the system was provided to other divisions, consultants, oil companies and other agencies.

Other Planning Services

Water Conservation: A section to develop goals, objectives and strategies for encouraging the conservation of water resources within Alberta was established in 1989-90. This section ensures that the principles of sustainable development are an integral component of water resource planning and management. The section will also develop, assess and recommend water demand management measures that may include economic, structural, operational and institutional techniques in order to achieve the conservation and wise use of Alberta's water resources.

Advice from several provincial government departments and agencies was solicited to identify water conservation issues, clarify roles and responsibilities in water conservation management, and identify practical tools of sustainable development in water resources management. Work was initiated to ensure that the concept of water conservation be included in the department's educational materials.

Regional Lake Overview: Work was undertaken to develop a process for establishing a warning system to identify lakes which are likely to be affected by development. The department will be able to respond proactively.

Graphics Design: A variety of base maps and finished products were produced for technical reports for Planning Division.

Visual aids were prepared for committees' task forces and in public presentations.

A variety of base maps and mosaics were developed for Alberta Public Works, Supply and Services in support of the Oldman Dam Project.

Municipal Water Demand Studies: Water demand forecasts for several municipalities were prepared for use in basin planning studies or to assist in establishing water licensing requirements.

Regional Water Demand Studies: Water demand studies were prepared for several municipalities for use in basin planning studies or to assist in water licencing requirements. An assessment of water demand by an in-situ heavy oil plant was also prepared as a follow-up to surveys conducted in the previous year.

Environmental Impact Assessment Review: Environmental impact assessments submitted to the department for proposed economic developments were reviewed from a water resources perspective.

Crown Mineral Review Disposition Committee: A review process identified several water resource management concerns regarding Crown lands and directed them to Alberta Energy's Mineral Resources Division.

Resource Integration Committee: This committee provides interdepartmental assistance to public land use planning in Alberta. The division aided this committee by providing departmental liaison with Alberta Forestry, Lands and Wildlife through the Integrated Resource Planning process.

MacKenzie River Basin Committee: Negotiations continued on bilateral water management agreements between Alberta and its Mackenzie basin neighbours to the west, north and east. Water quality data collection programs on the Slave and Hay Rivers proceeded with monitoring of water quality at the Alberta-Northwest Territories border. Staff were also involved in the preparation of a draft bilateral agreement for transboundary water management on the Alberta-Northwest Territories border.

Joint technical studies were continued with British Columbia to prepare for drafting an Alberta-British Columbia transboundary water management agreement. Division staff participated on a number of technical sub-committees which are collecting data on hydrology, water quality, water uses and instream flow needs of the Peace River at the Alberta/BC boundary.

STATISTICAL TABLES

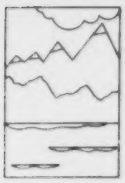


TABLE 1
Positions by Category

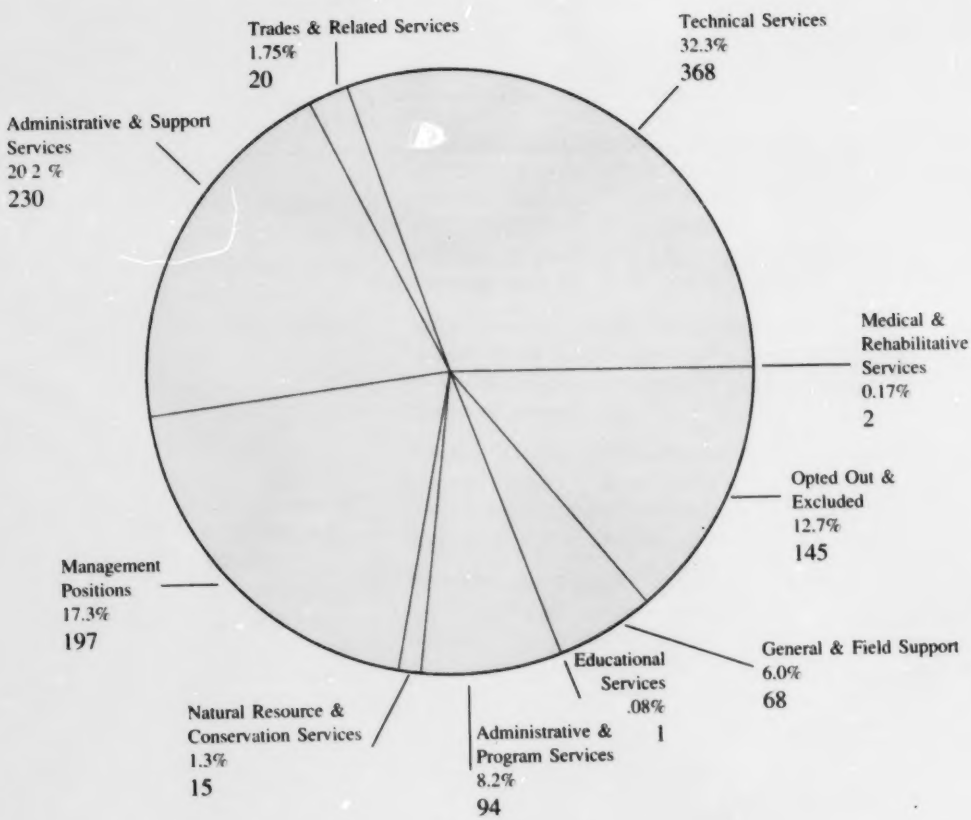


TABLE 2 - Employee Location

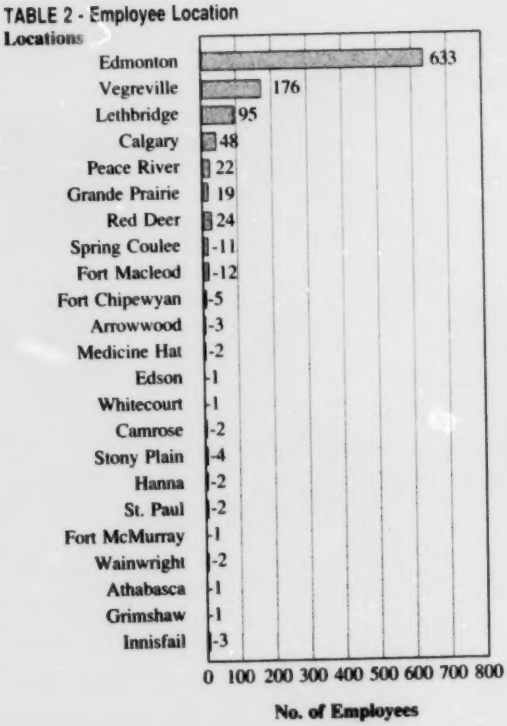


TABLE 3 - Employee Distribution

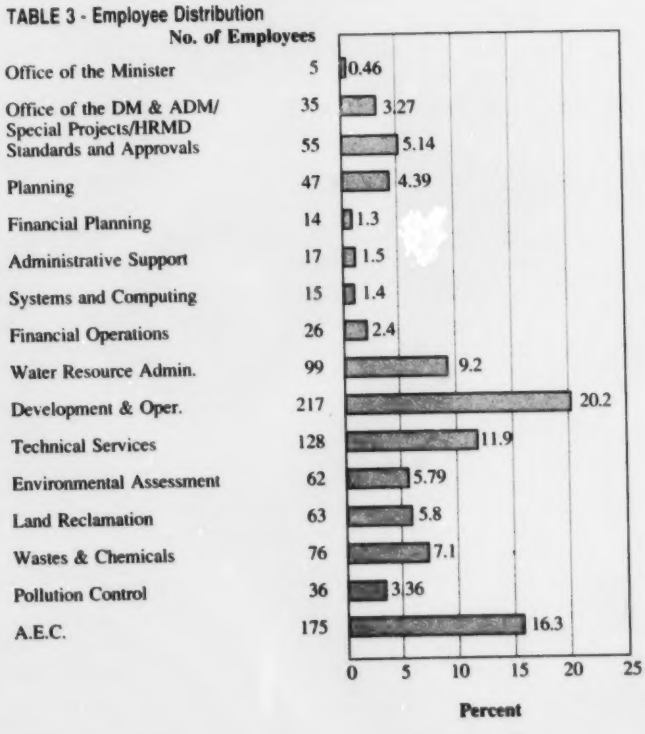

No. of Employees
Office of the Minister 5 0.46
Office of the DM & ADM/ Special Projects/HRMD Standards and Approvals 55 5.14
Planning 47 4.39
Financial Planning 14 1.3
Administrative Support 17 1.5
Systems and Computing 15 1.4
Financial Operations 26 2.4
Water Resource Admin. 99 9.2
Development & Oper. 217 20.2
Technical Services 128 11.9
Environmental Assessment 62 5.79
Land Reclamation 63 5.8
Wastes & Chemicals 76 7.1
Pollution Control 36 3.36
A.E.C. 175 16.3
0 5 10 15 20 25
Percent

TABLE 4
Development Applications Linear Projects Section

Type of Projects	Number of Projects Approved 1989	1990
Development and Reclamation Pipelines	50	51
Non Development and Reclamation Pipelines	245	243
Water and Sewer Pipelines	15	22
Electric Transmission Lines	33	24
Industrial EIA Projects	11	16
Total	354	356

Table 5
Operational Reclamation Projects 1989-90

Disturbance	Municipal	Public	Green Zone	Total
Garbage Dumps/ Landfills	24	-	1	25
Sewage Lagoons	10	-	-	10
Gravel and Sand Pits	12	2	1	15
Coal Mines	3	-	-	3
Industrial Sites	5	-	2	7
Water Reservoirs	3	-	-	3
Miscellaneous	-	2	3	5
Total	57	4	7	68

TABLE 6
New Project Referrals to EIA Review Branch
April 1, 1989 - March 31, 1990

Type of Projects	Number of Referrals
Coal Mines	10
Industrial	25
Oil and Gas	13
Oil Sands	8
Water Resources	2
Hydro and Electric	5
Linear	5
Recreation	9
Other	2
TOTAL	79

TABLE 7
Ministerial Consents Summary (April 1, 1989 To March 31, 1990)

RDA	Total Requests	Consent	No Consent Refusal	Required	* P/W/A
Calgary	98	89	0	1	8
Capital City Park	3	3	0	0	0
Edmonton	56	46	1	1	8
Edmonton-Devon	18	18	0	0	0
Edmonton-Fort Saskatchewan	12	9	0	2	1
Fish Creek	0	0	0	0	0
Fort McMurray	2	2	0	0	0
Sherwood Park West	11	5	0	1	5
Strathcona	0	0	0	0	0
Turtle Mountain	2	1	0	0	1
TOTAL	202	173	1	5	23

* *Pending/Withdrawn/Administrative Closure*

TABLE 8
Subdivision Referral Activities

Planning Authority	No. of Applications 1988/89	1989/90
REGIONAL PLANNING COMMISSIONS		
Battle River	54	79
Calgary	324	184
Edmonton Metropolitan	82	85
Mackenzie	62	34
Oldman River	88	95
Palliser	93	126
South Peace	31	32
Red Deer	180	187
Southeast Alberta	27	16
Yellowhead	158	156
Municipal Affairs	183	147
CITIES & TOWNS		
Airdrie	5	8
Camrose	0	0
Leduc	1	1
Lethbridge	0	0
Fort McMurray	0	2
St. Albert	9	26
Fort Saskatchewan	2	2
Canmore	0	11
COUNTIES		
Grande Prairie No. 1	38	32
Parkland No. 31	30	37
Strathcona No. 20	28	30
Red Deer No. 23	0	80
MUNICIPAL DISTRICT OF		
Rocky View No. 44	317	311
Foothills No. 31		259
IMPROVEMENT DISTRICTS		
I.D. #5	0	8
TOTAL	1,712	1,948

TABLE 9
Air Quality Permits and Licences 1989-90

Category	Permits	Licences
Alfalfa Dehydrating	3	5
Asphalt Plants	8	24
Chemical Plants	10	21
Compressor Stations	19	58
Concrete and Cement	0	2
Experimental In-Situ Oil Sand Operations	2	6
Feed Mills	1	12
Fertilizer Plants	1	5
Gas Processing Plants	46	82
Incinerators	6	72
Meat Packing and Processing Plants	0	3
Petroleum Refineries	1	2
Power Plants	2	2
Pulp Mills	1	0
Seed Cleaning Plants	0	4
Wood Processing	6	8
Others	12	22
Subtotal	118	328
Amendments	9	207
Total	127	528

TABLE 10
Clean Water Act Approvals Issued 1989-90

Category	Permits	Licences
Asphalt plants	0	21
Chemical plants	3	22
Fertilizer plants	2	5
Gas processing plants	10	64
In-situ heavy oil/ Tar sands	3	12
Industrial landfills	3	6
Landfill treatment	5	2
Meat packing and processing plants	1	10
PCB storage plants	0	9
Petroleum refineries	1	3
Pulp mills	2	4
Sand and gravel washing plants	1	36
Snow Disposal Sites	0	2
Wood processing	0	3
Others	19	28
Subtotal	50	227
Amendments	13	123
TOTAL	69	350

TABLE 11
Municipal Branch Approvals 1989-90

Type of Approval	Number of Approvals Issued
Permit to Construct	332
Permits Amended	13
Certificate of Compliance (final construction approval)	41
Letters of Permission	55
Letters of Permission Amended	12
Letters - "No Objection to Use"	33
Licences to Operate	90
Licences Amended	33
Licences Renewed	4

TABLE 12
Water delivered by Headworks Systems - 1989

Headworks Systems	Volume (Ac.Ft.)
Waterton-St. Mary	631,000
Carseland-Bow River	356,000
Lethbridge Northern	195,000
Western	108,000
Mountain View, Leavitt, Aetna	13,000
TOTAL	1,303,000

TABLE 13
Summary of Records Administration Section Activities, 1989 - 1990

Fiscal Year	Files Created	Reports Indexed	Files Retrieved	Plans Filmed	35mm Images Produced	16mm Images Produced	Micro-Jackets Produced	Duplicated Film Produced
1987-88	570	546	27,500	5,043	8,321	421,265	21,588	36,322
1988-89	607	286	25,374	4,654	9,541	196,544	5,400	25,483
1989-90	716	364	27,855	3,791	8,376	223,757	5,009	22,620

Records Disposition
1987-88 - 63 Cubic Feet
1988-89 -168 1/2 Cubic Feet
1989-90 - 62 Cubic Feet

TABLE 14
Surface Water Rights Progress Report

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 89/90	Total 88/89
Applications Received	0	10	58	186	10	0	20	43	0	95	422	445
Interim Licences Issued	0	12	71	181	26	0	14	66	0	120	490	428
Interim Licences Re-issued	0	3	24	20	7	0	0	12	0	11	77	345
Licences Issued	0	10	72	169	22	0	3	29	0	82	387	330
Licences Re-issued	0	7	18	23	11	0	1	2	0	1	63	248
Permits Issued	0	328	0	0	346	0	41	0	0	0	715	821
Transfers	0	0	25	22	41	0	1	0	0	0	89	128
Cancellations	0	1	31	21	8	2	2	10	0	10	85	118

NOTE: Statutory purpose domestic was changed to agricultural on June 8, 1984 for all surface water rights projects. Issuance of Licence Re-issued & Interim Licence Re-issued were ceased in August 1989.

TABLE 15
Surface Water Rights In Good Standing As Of March 31, 1990

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Water Power	Other	Storage	Natural State	Dvrsn.	Total 89/90	Total 88/89
Applications	0	23	297	67	14	0	46	46	0	137	630	637
Interim Licences	0	29	374	166	30	1	50	122	0	580	1,352	1,306
Licences	0	328	2,206	6,612	331	8	123	688	1	1,145	11,442	11,124
Net Totals	0	380	2,877	6,845	375	9	219	756	1	1,862	13,424	13,067

NOTE: Statutory purpose domestic was changed to agricultural on June 8, 1984 for all surface water rights.

TABLE 16
Net annual hydro-electric generation

Year	Megawatt-Hours
1985	1,385,366
1986	1,821,670
1987	1,459,252
1988	1,447,629
1989	1,616,310

TABLE 17
Groundwater Rights Progress Report

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Other	Dvrsn.	Storage	Total 89/90	Total 88/89	Total 87/88
Exploration Permits Issued	4	41	8	249	36	15	1	1	355	44	111
Applications Received	9	56	1	601	37	13	18	3	738	513	246
Interim Licences Issued	5	95	3	662	9	12	0	0	789	303	159
Interim Licences Updated	0	0	0	0	0	0	0	0	0	51	69
Temporary Permits Issued	2	0	0	1	21	1	15	0	40	11	61
Temporary Permits Updated	0	0	0	0	1	0	1	0	2	2	7
Licences Issued	1	68	0	584	0	1	0	0	654	197	290
Licences Re-issued	0	13	0	1	0	0	0	0	14	30	19
Transfers	0	2	0	7	5	0	5	0	19	93	31
Cancellations	2	5	0	3	42	1	0	0	53	31	86

Note: All data represents number of wells except Exploration Permits. Issuance of Licence Re-issued & Interim Licence Re-issued were ceased in August 1989.

TABLE 18
Groundwater Rights In Good Standing As Of March 31, 1990

	Dom.	Mun.	Irgtn.	Agr.	Ind.	Other	Dvrsn.	Storage	Total 89/90	Total 88/89	Total 87/88
Applications	0	22	0	77	10	0	0	1	110	131	31
Interim Licences	20	80	6	121	48	26	5	4	310	191	185
Licences	108	818	19	1,442	467	130	17	9	3,010	2,385	2,191
Temporary Permits*	6	0	0	0	329	2	72	0	409	370	359
Net Totals	134	920	25	1,640	854	158	94	14	3,839	3,077	2,766

* *Temporary permits were removed from the application stage into a separate category effective March 30, 1987.*

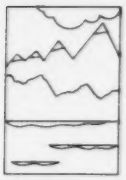
TABLE 19
Summary Regional Services Branch Activities 1989-90

	Peace River	Edmonton	Red Deer	Calgary	Lethbridge
Inspections					
Requests Received	264	387	200	116	154
Number Conducted	226	396	201	165	183
Water Resources Act					
Licenses (Interim) Issued	32	64	3	11	13
Permits Issued	168	297	106	111	44
Letters of Authority	82	114	118	82	34
Water Management Projects					
Number of Alberta Water Management and Erosion Control Program Projects	16	36	10	4	7
Total Cost	$823,150	$1,520,150	$496,720	$470,450	$799,480
Farm Water Management Program					
Requests Received	31	22	16	0	10
Designs Completed	40	11	11	0	12
Enforcement					
Cases Reviewed by Enforcement Committee	2	6	4	1	4
Court Briefs Prepared for Prosecution	0	2	1	1	4

TABLE 20
Summary of Water Supplies Assistance Program Activities 1989-1990

	Peace River	Edmonton	Red Deer	Calgary	Lethbridge	Total
Well Drilling Grants						
No. of Grants Paid	266	2,531	1,171	950	504	5,422
Grant Payments	$ 461,960	$ 3,404,280	$ 1,487,320	$ 1,243,300	$ 1,229,040	$ 7,825,800
Community Projects						
No. of Projects	2	5	0	1	2	10
Grant Payments	$ 39,000	$ 19,830	$ 0	$ 8,230	$ 178,310	$ 245,370
Equipment Rental Costs	$ 940	$ 22,110	$ 0	$ 5,380	$ 28,440	$ 56,870

FINANCIAL STATEMENTS



Statement of Expenditures

Statement of Revenues

STATEMENT OF EXPENDITURES
FOR THE YEAR ENDED MARCH 31, 1990

		1989-90	1988-89
1.	**DEPARTMENTAL SUPPORT SERVICES**		
	Minister's Office	$ 315,655	$ 312,051
	Deputy Minister's Office	357,918	370,768
	Executive Management	823,539	1,181,096
	Systems and Computing	1,224,791	1,156,593
	Policy Planning and Information Services	2,039,013	1,455,680
	Personnel and Organization Development	663,660	608,098
	Finance and Office Services	2,107,667	1,987,264
	TOTAL	$ 7,532,243	$ 7,071,550
2.	**ENVIRONMENTAL PROTECTION, ENHANCEMENT AND RESEARCH**		
	Land Conservation	$ 3,269,534	$ 4,740,541
	Environmental Assessment	5,997,064	4,647,487
	Standards and Approvals	3,862,226	3,542,851
	Wastes and Chemicals	13,667,539	12,746,736
	Pollution Control	2,905,056	2,173,126
	Environmental Research	11,321,476	10,535,543
	TOTAL	$ 41,022,895	$ 38,386,284
3.	**WATER RESOURCES MANAGEMENT**		
	Surface Water Development and Operations	$ 16,326,077	$ 16,090,393
	Water Resources Administration	9,717,176	9,660,949
	Water Resources Planning and Coordination	4,094,459	3,803,043
	Data Collection and Inventory	18,421,309	17,317,240
	TOTAL	$ 48,559,021	$ 46,871,625
4.	**SPECIAL WASTE MANAGEMENT ASSISTANCE**	$ 25,065,000	$ 27,958,000
5.	**OVERVIEW AND COORDINATION OF ENVIRONMENTAL CONSERVATION**	$ 989,949	$ 795,782
	STATUTORY APPROPRIATIONS		
	Water Resources Revolving Fund	$ 24,090	$ (271,006)
	TOTAL GENERAL REVENUE FUND EXPENDITURES	$ 123,193,198	$ 120,812,235
	HERITAGE SAVINGS TRUST FUND		
	Farming For the Future	$ 61,902	$ 71,603
	Irrigation Rehabilitation and Expansion	15,058	46,247
	Irrigation Headworks Improvement	35,721,245	31,139,618
	Land Reclamation	2,248,427	1,661,734
	TOTAL HERITAGE SAVINGS TRUST FUND EXPENDITURES	$ 38,046,632	$ 32,919,202
	TOTAL EXPENDITURES	**$ 161,239,830**	**$ 153,731,437**

Note: Comparative Figures
The 1988-89 figures have been restated to conform to the 1989-90 presentation.

STATEMENT OF REVENUES
FOR THE YEAR ENDED MARCH 31, 1990

SOURCES OF REVENUE	1989-90	1988-89
Payments From the Government of Canada	$ 462,263	$ 45,634
Water Power Rentals	298,134	284,761
Water Diversion Licences	13,022	12,465
Water Well Drilling Permits	4,070	22,214
Industrial Water Diversion	138,715	125,989
Sheerness Deadfish Water Supply	71,232	67,509
Northwest Alberta Cost Sharing Program	18,598	6,911
Winagami Lake-Girouxville Canal	4,391	4,373
Emergency Water Pumping	2,689	1,027
Property Rental-A.E.C.	2,594	3,242
Groundwater Information Service	12,652	17,024
Administration of Crown Land	12,151	10,334
Forfeits-Plans and Specifications	1,700	16,169
A.E.C.-Research Contributions	30,350	25,800
Other Expenditure Refunds-A.E.C.	168,087	19,029
Other Expenditure Refunds-Development & Operations	6,544	-
Previous Years Refunds	47,090	47,618
Salary Expense Refunds	-	7,955
Kroeger Water Services Commission	9,138	-
Recovery of Salary from AUPE	908	18,385
Miscellaneous	15,446	32,904
TOTAL REVENUE	**$ 1,319,774**	**$ 769,343**

WATER RESOURCES REVOLVING FUND FINANCIAL STATEMENTS

MARCH 31, 1990

Auditor's Report

Balance Sheet

Statement of Income and Surplus

Statement of Changes in Financial Position

Notes to the Financial Statements

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Minister of the Environment

I have examined the balance sheet of the Water Resources Revolving Fund as at March 31, 1990 and the statements of income and surplus and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1990 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Donald D. Salmon

FCA
Auditor General

Edmonton, Alberta
July 19, 1990

WATER RESOURCES REVOLVING FUND BALANCE SHEET
AS AT MARCH 31, 1990

	1990	1989
Assets		
Current:		
Accounts receivable	$ 381,627	$ 486,969
Inventories	186,972	251,086
Prepaid expenses	3,425	3,219
	572,024	741,274
Fixed (Note 3)	2,824,751	2,660,267
	$ 3,396,775	$ 3,401,541
Liabilities and Surplus		
Accounts payable	$ 204,979	$ 230,603
Advances from the General Revenue Fund	3,046,526	3,102,154
	3,251,505	3,332,757
Surplus	145,270	68,784
	$ 3,396,775	$ 3,401,541

The accompanying notes are part of these financial statements.

WATER RESOURCES REVOLVING FUND STATEMENT OF INCOME AND SURPLUS

FOR THE YEAR ENDED MARCH 31, 1990

	1990	1989
Revenue:		
Material and gas sales	$ 273,323	$ 291,541
Less: Cost of goods sold	259,219	278,348
Gross profit	14,104	13,193
Equipment rental	1,760,344	2,050,973
	1,774,448	2,064,166
Expenses:		
Equipment operating costs	981,819	1,058,339
Depreciation	503,319	502,882
Equipment rental	221,159	240,043
Repairs and maintenance	42,922	44,498
Administration (Note 4)	29,514	30,741
	1,778,733	1,876,503
Income (loss) from operations	(4,285)	187,663
Gain on disposal of equipment	80,771	538
Income for the year	76,486	188,201
Surplus (defecit) at beginning of year	68,784	(119,417)
Surplus at end of year	$ 145,270	$ 68,784

WATER RESOURCES REVOLVING FUND STATEMENT OF CHANGES IN FINANCIAL POSITION

FOR THE YEAR ENDED MARCH 31, 1990

	1990	1989
Operating Activities		
Cash from operations:		
Net income for the year	$ 76,486	$ 188,201
Net charges (credits) to income which do not affect cash:		
Depreciation	503,319	502,882
Gain on disposal of equipment	(80,771)	(538)
	499,034	690,545
Changes in non-cash items:		
Decrease (increase) in accounts receivable	105,342	(139,012)
Decrease (increase) in inventories	64,114	(23,621)
Increase in prepaid expenses	(206)	-
Decrease in accounts payable	(25,624)	(13,730)
	642,660	514,182
Investing activities		
Proceeds from equipment disposals	87,560	11,609
Purchase of equipment	(674,592)	(407,527)
	(587,032)	(395,918)
Decrease in advances from the General Revenue Fund	$ 55,628	$ 118,264

WATER RESOURCES REVOLVING FUND NOTES TO THE FINANCIAL STATEMENTS
MARCH 31, 1990

Note 1 Authority

The Water Resources Revolving Fund operates under the authority of the Water Resources Act, Chapter W-5, Revised Statutes of Alberta 1980, as amended.

Fund revenue is derived from rentals and sales to the Department of Environment.

Note 2 Significant Accounting Policies and Reporting Practices

(a) Fixed assets and depreciation

Fixed assets are shown at cost less accumulated depreciation. Depreciation is calculated on a straight-line basis over the estimated useful life of each type of equipment.

(b) Major overhauls

Major overhauls, significantly extending the life of equipment, are depreciated on a straight-line basis over the remaining useful life of the equipment.

(c) Inventories

Inventories are valued at the lower of cost and net realizable value.

(d) Leases

All leases with respect to the rental and maintenance of equipment, as lessee or lessor, can be cancelled at the end of any fiscal year and are therefore accounted for as operating leases.

Note 3 Fixed Assets

	Cost	Depreciation and Amortization	1990 Net	1989 Net
Rental equipment	$7,236,154	$4,468,304	$2,767,850	$2,633,030
Maintenance and office equipment	293,036	236,135	56,901	27,237
	$7,529,190	$4,704,439	$2,824,751	$2,660,267

Note 4 Administration Expenses

Salaries, wages, rental charges for the Edmonton, Lethbridge, Grande Prairie and Peace River warehouses and certain overhead costs incurred in the administration of the Fund are borne by the General Revenue Fund and are not reflected in these financial statements.

Note 5 Approval of Financial Statements

These financial statements were approved by management.

SURFACE RECLAMATION FUND FINANCIAL STATEMENT
MARCH 31, 1990

Balance Sheet

Notes to the Financial Statement

SURFACE RECLAMATION FUND BALANCE SHEET
AS AT MARCH 31, 1990

	1990	1989
Assets		
Cash (Note 2)	$ 1,571,733	$ 1,494,546
Securities in trust with the Province of Alberta	313,050	344,300
	$ 1,884,783	$ 1,838,846
Liabilities		
Trust Fund (Note 3)	$ 1,884,783	$ 1,838,846

The accompanying notes are part of this financial statement.

SURFACE RECLAMATION FUND NOTES TO THE FINANCIAL STATEMENT
MARCH 31, 1990

Note 1 Authority

The Surface Reclamation Fund operates under the authority of the Land Surface Conservation and Reclamation Act, Chapter L-3, Revised Statues of Alberta 1980, as amended. The purpose of the Fund is to hold security deposits received pursuant to the Act as an assurance that satisfactory land surface reclamation will be performed. Since all interest received by the Fund is allocated and subsequently paid to depositors, no surplus or deficit arises on the Fund's operations.

Note 2 Cash

Cash consists of deposits in the Consolidated Cash Investment Trust Fund of the Provincial of Alberta.

Note 3 Trust Fund

Transactions in the Trust Fund are summarized as follows:

	Cash Deposits	Securities	1990 Total	1989 Total
Balance at beginning of year	$ 1,494,546	$ 344,300	$ 1,838,846	$ 1,718,554
Security Deposits received	330,175	168,550	498,725	647,496
Interest Received	179,274	-	179,274	128,202
	2,003,995	512,850	2,516,845	2,494,252
Security deposits returned	(432,262)	(199,800)	(632,062)	(655,406)
Balance at end of year	$ 1,571,733	$ 313,050	$ 1,884,783	$ 1,838,846

Note 4 Bank Guarantees

In addition to the deposits in trust and securities shown on the balance sheet, the Fund held bank guarantees as at March 31, 1990 in the amount of $89,321,175 (1989 -$80,257,436).